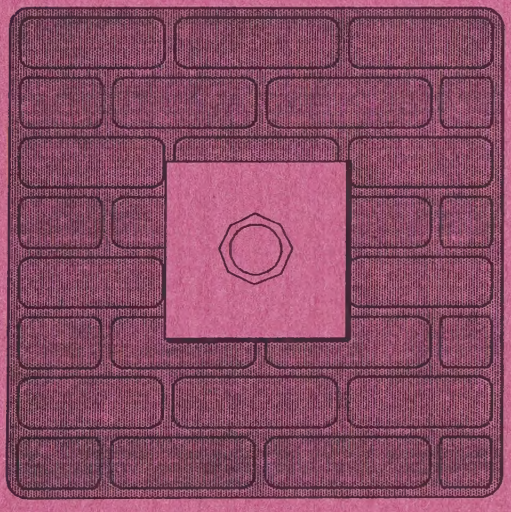
SEISMIC RETROFITTING ALTERNATIVES FOR SAN FRANCISCO'S UNREINFORCED MASONRY BUILDINGS:

Socioeconomic and Land Use Implications of Alternative Requirements

Prepared for the
San Francisco Department of City Planning



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I. INTRODUCTION

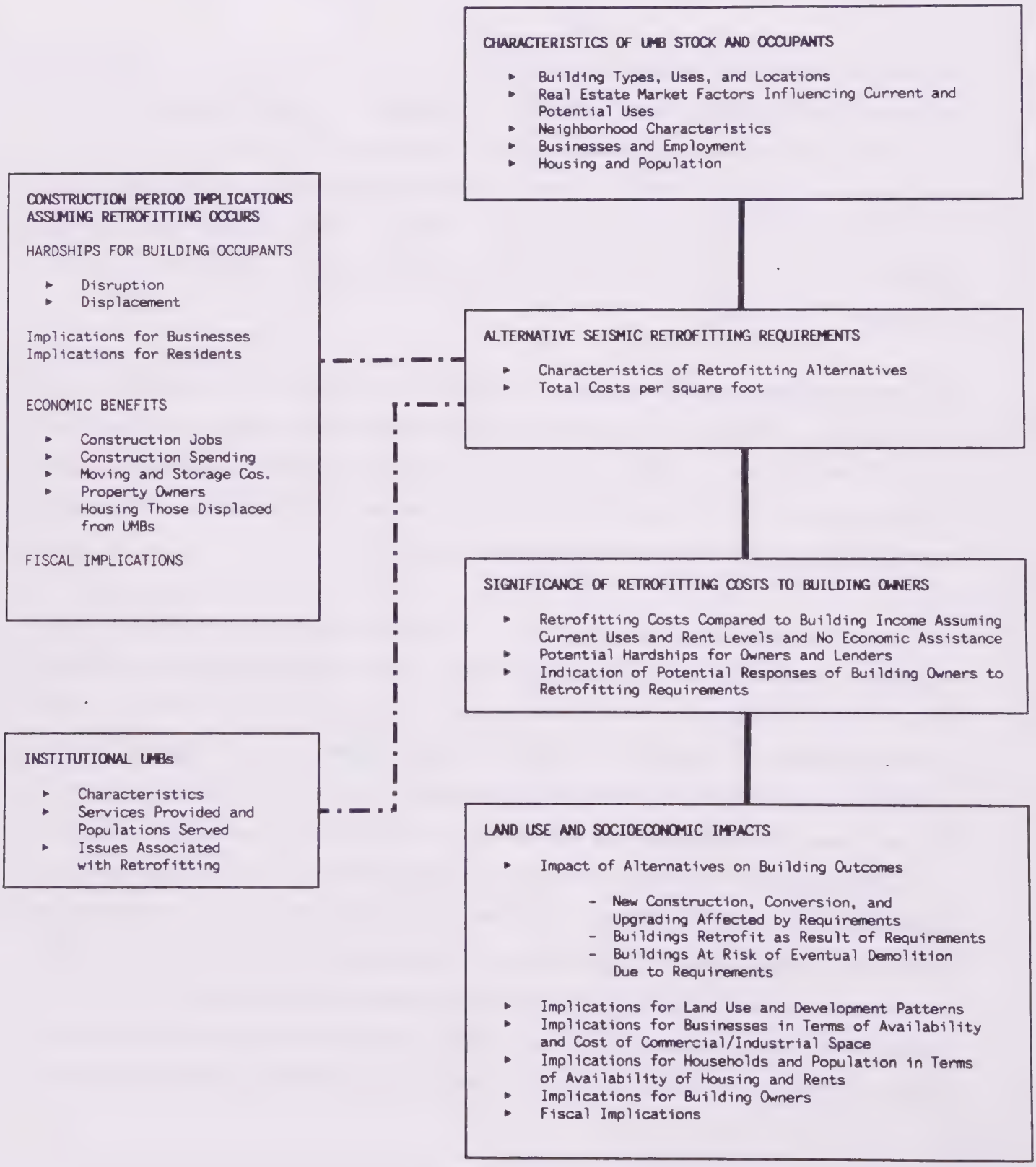
This is one of a series of reports by the City and County of San Francisco related to programs to address the seismic retrofitting of unreinforced masonry buildings (UMBs). This report presents the conclusions of a technical analysis of the socioeconomic and land use implications of three alternative seismic retrofitting requirements. An overview of the socioeconomic and land use study is presented in Figure 1. In addition to this introductory chapter, there is a chapter in this report for each of the components of the study highlighted in the figure.

The study begins by describing, from a socioeconomic and land use perspective, the characteristics of the unreinforced masonry building (UMB) stock and of the occupants of UMBs. (See Chapter II.) Next, the alternative seismic retrofitting requirements are summarized briefly and estimates of total costs per square foot associated with each retrofitting alternative are presented. (See Chapter III.)

The study then describes the significance of the retrofitting costs to owners of UMBs (Chapter IV) and the extent to which requirements to spend money to complete the seismic retrofitting would influence building-owner decisions about the longer-term use of their property (Chapter V). Much of the technical analysis focuses on consideration of how the alternative requirements are likely to affect building outcomes. Will buildings be retrofit? Will new construction, conversion, and upgrading be affected? Will buildings be at risk of eventual demolition due to the retrofitting requirements? Those effects of the requirements on building outcomes are then evaluated from several perspectives to determine who would bear the costs of the retrofitting requirements over the longer-term. The **land use** perspective assesses impacts on development patterns in areas of the City in which UMBs are concentrated. The **business** perspective assesses impacts on the availability and cost of space of various types, and the **resident** perspective assesses

FIGURE 1
SOCIOECONOMIC AND LAND USE IMPLICATIONS OF SEISMIC RETROFITTING ALTERNATIVES

STUDY OVERVIEW



impacts on the availability of housing and rents. The **building-owner** perspective considers how the overall impacts of the requirements on the supply of space and on rents would affect the longer-term incidence of retrofitting costs. Finally, the **fiscal** perspective considers how impacts on building values and building outcomes could affect revenues from property taxes.

Potential construction period implications of the alternative seismic retrofitting requirements also are addressed. (See Chapter VI). First, impacts are described in terms of hardships and costs to business and residential occupants of UMBs while the work was underway. Then the range of potential economic benefits associated with construction and relocation from a citywide perspective are identified. The implications of construction activity and associated disruption for the City's fiscal situation also are discussed. The assumption for this part of the study is that the retrofitting work would be done for all buildings. Construction-period implications are independent of the longer-term evaluation of building outcomes that assesses the likelihood that UMBs would or would not be retrofit.

Throughout, the study provides a comparative description of effects to assist in decision-making regarding the choice of a preferred alternative. The study also provides information that can be used to refine a program to implement a particular alternative.

The analysis draws on building data and assumptions for UMBs categorized by use, location, building type, and other factors. While appropriate for program-level decision-making, that technical analysis does not provide definitive information or conclusions for any particular building.

Study results are presented both quantitatively and qualitatively depending on the topic. The quantitative results should be viewed as order-of-magnitude estimates useful for evaluating differences among alternatives.

Most of the technical analysis of the socioeconomic and land use implications of the retrofitting alternatives focuses on commercial/industrial and residential UMBs. The implications for institutional UMBs are separately addressed. (See Chapter VII.) The conclusions for commercial/industrial and residential UMBs are based on generalizations about building economics, characteristics of types of buildings and building occupants, and real estate market factors. For institutional UMBs, such a market-based approach is not appropriate. Instead, the functions served by UMBs and the circumstances of the institution are more important to the impact assessment. Therefore, the evaluation of institutional UMBs is more individualized and is based largely on interviews with the institutional owners. The nature of the conclusions also differs in that the results are not readily quantified and are best expressed through description of key issues of concern.

II. CHARACTERISTICS OF UNREINFORCED MASONRY BUILDING STOCK AND OF OCCUPANTS

This chapter describes the unreinforced masonry building stock and the occupants of UMBs as background to evaluation of the socioeconomic and land use implications of the seismic retrofitting alternatives. The UMBs are categorized by building type, use, and location. The amount of space and number of housing units in UMBs are identified. The description of the buildings--where they are located and how they are used--is important to understanding the analysis in subsequent chapters of building owner decisions with respect to the alternative retrofitting requirements. Description of the characteristics of businesses in UMBs and of the residential population in UMBs establishes a basis from which to evaluate implications for building occupants.

BUILDING TYPES AND USES

The conclusions presented in this report are based on analysis of 2,007 privately-owned unreinforced masonry buildings. The buildings include, among other types, single-story neighborhood garages, downtown commercial structures, multi-story warehouses, single-room-occupancy hotels, large apartments along the Bush Street Corridor, flats and single-family homes scattered in outlying neighborhoods, and small, mixed commercial and residential structures in Chinatown and North Beach. A special category of privately-owned institutional buildings includes a wide range of building types: housing, utility structures, and church sanctuaries.

The structural characteristics of the UMBs are important to the economic analysis, because they determine the extent of the work and the type of materials needed to accomplish the alternative levels of seismic strengthening. To assign strengthening costs as well as potential seismic damage characteristics, Rutherford & Chekene (R&C), structural engineers, defined 15 building prototypes and categorized the 2,007 UMBs by prototype

according to structural features of each building. (See R&C report, Section 1: Prototype Definition Method and Section 2: Prototype Descriptions.) Table 1 shows the distribution of UMBs by prototype, with a description of the key structural features of each. Figure 2 presents a sketch representative of each prototype.

TABLE 1
NUMBER OF UNREINFORCED MASONRY BUILDINGS BY STRUCTURAL PROTOTYPE

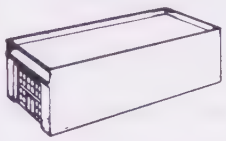
Prototype	No. of UMBs	Percent of UMBs	Description
A	136	7%	Small Area, One-Story
B	169	9%	Large Area, One-Story
C	138	7%	Irregular Shape, Residential
D	97	5%	Irregular Shape, Non-Residential
E	89	4%	Small Area, Industrial
F	143	7%	Large Area, Industrial
G	236	12%	Small Area, 2 & 3 Story, Office & Commercial
H	176	9%	Large Area, 2 & 3 Story, Office & Commercial
I	70	3%	Small Area, Over 3 Story, Office & Commercial
J	83	4%	Large Area, Over 3 Story, Office & Commercial
K	162	8%	Small Area, 2 & 3 Story, Residential
L	147	7%	Large Area, 2 & 3 Story, Residential
M	139	7%	Small Area, Over 3 Story, Residential
N	162	8%	Large Area, Over 3 Story, Residential
O	60	3%	Public Assembly
	2,007	100%	

NOTE: See Figure 2 for sketches representative of each prototype.

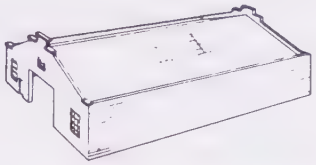
The building use classifications indicated for the prototypes do not necessarily correspond with the more detailed use classifications developed for other aspects of the analysis.

SOURCE: Rutherford & Chekene

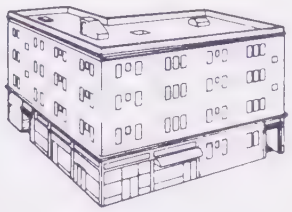
San Francisco's privately-owned UMBs cover a full range of building types and the UMBs are relatively evenly distributed across the 15 prototypes. No one characteristic, such as number of stories or average building footprint, predominates.



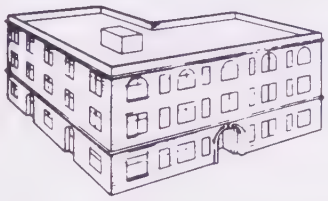
A. Small Area, One Story



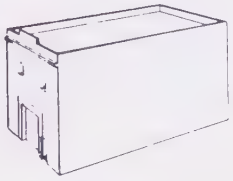
B. Large Area, One Story



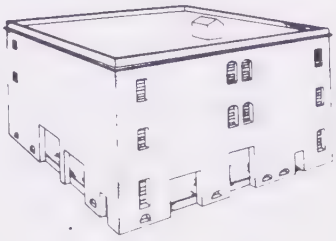
C. Irregular, Residential



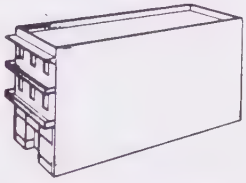
D. Irregular, Nonresidential



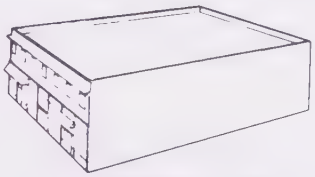
E. Small Area, Industrial



F. Large Area, Industrial



G. Two and Three Story, Small Area, Office and Commercial



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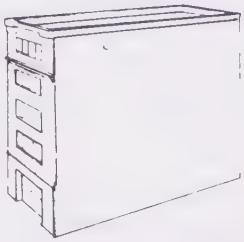
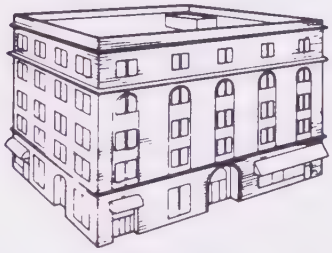
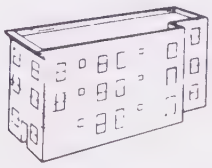


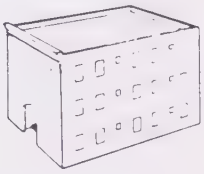
I. Over Three Story, Small Area, Office and Commercial



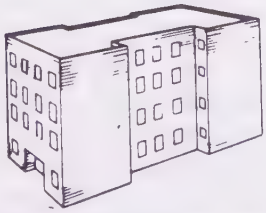
J. Over Three Story, Large Area, Office and Commercial



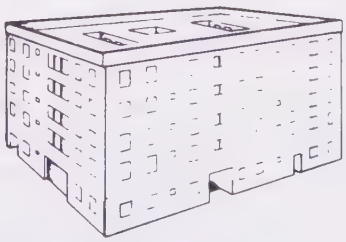
K. Two and Three Story, Small Area, Residential



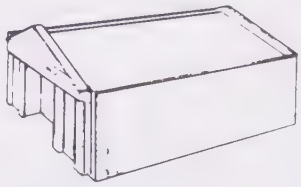
L. Two and Three Story, Large Area, Residential



M. Over Three Story, Small Area, Residential



N. Over Three Story, Large Area, Residential



O. Public Assembly

Figure 2: The 15 Selected Prototypes

While the socioeconomic analysis categorizes the UMBs in other ways (by location and by use, as described below), the building prototype categories are also important to the conclusions presented herein. The construction and related costs for each retrofitting alternative used in the economic analysis were defined by R&C for those prototypes. The engineering analysis also provided estimates for other important factors that varied by prototype or use, such as duration of retrofitting, and other characteristics of the work required for each alternative. Much of the cost side of the economic analysis behind the building outcomes and tenant impacts described later in this report is based on Rutherford & Chekene's prototype definition and conceptual cost estimation.

Another important way of looking at UMBs in San Francisco is by use. The use classifications for the UMB studies are based on real estate class codes developed by the City Assessor's office to categorize buildings in the City for property tax assessment purposes.* Table 2 shows the distribution of UMBs by use.

As is the case with the categorization by structural prototype, the categorization by use indicates that diversity is a key feature of the population of UMBs in San Francisco. There are offices, storefront retail establishments, downtown retail establishments, places of entertainment, hotels, auto repair garages, gas stations, wholesale showrooms, and manufacturing and warehouse facilities in UMBs. Most of the housing types in the City are also found in UMBs.

About 60% of the UMBs are categorized as commercial/industrial uses. Almost half of those buildings are in the commercial use category, including stores, eating and drinking places, banks, and other smaller commercial establishments. The next largest group is the

*San Francisco Assessor's data by occupancy code were combined with other information about building occupancy to arrive at the summary use designations for the socioeconomic analysis. Information identifying the Standard Industrial Classification (SIC) for businesses in the building (from PG&E) and information on the number of businesses in the building (from the reverse telephone directory) supplemented Assessor's occupancy data for some commercial/industrial UMBs. Records from the Bureau of Building Inspections's Division of Apartment and Hotel Inspection (DAHI) provided data on types of units in residential UMBs that were used to categorize them. A limited amount of field work was undertaken, particularly to classify institutional UMBs.

TABLE 2
NUMBER OF UNREINFORCED MASONRY BUILDINGS BY USE

Use Category	Number of UMBs	Percent of Total
Commercial/Industrial Uses		
Commercial /a/	505	25%
Office	208	10%
Commercial in Industrial Buildings	67	3%
Industrial/Warehouse	256	13%
Garage	72	4%
Hotel	33	2%
Theaters and Clubs	30	1%
Subtotal	1,171	58%
Residential Uses		
Dwellings and Flats without Commercial	72	4%
Flats with Commercial	58	3%
Apartments with Commercial	223	11%
Apartments without commercial	202	10%
Residential Hotels	150	7%
Mixed Residential and Tourist Hotels	83	4%
Subtotal	788	39%
Institutional Uses		
Churches and Related	32	2%
Schools and Related	12	1%
Hospitals and Related	4	0%
Subtotal	48	3%
TOTAL	2,007	100%

/a/ Includes retail, restaurant, and personal service establishments. Also includes office businesses above ground-floor retail.

SOURCE: Recht Hausrath & Associates and Department of City Planning

industrial/warehouse use category. A separate estimate was made of formerly industrial buildings that now appear to be in commercial use (shown as "commercial in industrial buildings" in Table 2), using data describing the number and types of businesses in UMBs. That estimate indicates that about one-fifth of the UMBs originally built for industrial use are now used by office, retail, and showroom activities.

There are about 800 UMBs (40% of the total) with predominantly residential occupancy. Many of the residential UMBs also have ground floor commercial space, an important consideration for the economic analysis since commercial space represents an important source of income to the building owner. Most of the residential buildings are larger, multi-unit structures; some single-family homes in outlying residential neighborhoods are also UMBs, however.

Of the total population of privately-owned UMBs in San Francisco, only a small share (about two percent) are institutional buildings. The characteristics of those buildings and their uses are discussed separately in Chapter VII.

COMMERCIAL/INDUSTRIAL UMBS

There are 1,171 unreinforced masonry buildings with commercial/industrial use designations: retail, office, industrial, warehouse, garage, hotel, and theater buildings. (See Table 2 above.) (The designations reflect the use for the majority of the space in the building. For this analysis, buildings with a mix of different commercial/industrial uses, such as office and ground floor retail, are identified by one use only.)

Location of the Buildings

The commercial/industrial UMBs are located throughout the City, with significant concentrations in downtown areas, Chinatown, and other areas east of Van Ness Avenue.

Table 3 presents the distribution of commercial/industrial UMBs by location.* The map in Figure 3 delineates the areas used for analysis of commercial/industrial UMBs. It covers those areas where UMBs are concentrated.

A relatively large percentage of commercial/industrial UMBs remain in the downtown areas from the Embarcadero to Civic Center (C-3-O North, C-3-O South, Union Square, Mid-Market/C-3-S, and Civic Center, in Table 3). That area accounts for about 35% of all commercial/industrial UMBs. Within the downtown, there are more of these older buildings remaining in the Union Square area and south of Market Street than there are in the heart of the Financial District or the Civic Center area. Another 18% of the commercial/industrial UMBs are located in South of Market planning areas (including Rincon Hill and Showplace Square). Although brick buildings appear to predominate along Second Street and in the Showplace Square area, the majority of the unreinforced masonry buildings in the South of Market are elsewhere--scattered throughout the blocks bounded by Howard, Third, and Townsend streets, and the Central Freeway.

Commercial/industrial UMBs also are prevalent in the Northeast Waterfront and Chinatown, with 10% and 9% of the total, respectively (in Table 3). The Northeast Waterfront includes Jackson Square, the Broadway commercial corridor, and the Northern Waterfront district north to Fisherman's Wharf. In both Jackson Square and Chinatown, UMBs represent a large share of the commercial/industrial building stock.

There are commercial UMBs along commercial streets throughout the City. Often the prominent corner buildings in neighborhood commercial areas are of unreinforced masonry construction. Commercial UMBs in outlying residential areas (neighborhood commercial districts, NC-1, NC-2 , and R districts) account for about five percent of the total. There are UMBs serving a variety of commercial/industrial purposes along major avenues such as

*The locations defined for analysis of commercial/industrial UMBs generally correspond to planning area and zoning boundaries. The locations are good approximations of market areas for real estate analysis. They also provide a means of evaluating alternative development options for owners of UMBs.

TABLE 3
COMMERCIAL/INDUSTRIAL UMBS BY LOCATION

Location	Number of UMBS	Percent of Total
C-3-O North	65	5%
C-3-O South	104	9%
Union Square	101	9%
Mid-Market/C-3-S	83	7%
Civic Center/South Van Ness	51	4%
South of Market (SSO/SPD) and Rincon Hill	41	4%
South of Market (SLI, SLR, RSD)	151	13%
Showplace	18	1%
Northeast Waterfront (Jackson Sq., Broadway/North Beach NCDs, Northern Waterfront, Fisherman's Wharf)	123	10%
Chinatown	101	9%
Van Ness	38	3%
Polk Street NCD	33	3%
North of Market/South of California (NOMA/SOCAL)	61	5%
Neighborhood Commercial Districts (NCDs) /a/	20	2%
Neighborhoods (NC-1, NC-2, and R districts)	40	3%
NC-3 Districts	33	3%
Mission Commercial	54	5%
Industrial Areas (Mission, Potrero and South Bayshore)	54	5%
TOTAL	1,171	100%

NOTE: The map in Figure 3 delineates the areas listed above. These areas are used for analysis of commercial/industrial UMBs in this study.

/a/ Includes all NCDs with UMBs except for the Broadway, North Beach, Polk Street NCDs that are separately identified above.

SOURCE: Recht Hausrath & Associates

Van Ness, Polk, and Geary (accounting for nine percent of all commercial/industrial UMBs). Lastly, the Mission, Potrero, and South Bayshore areas have about 10% of the commercial/industrial UMBs. The UMBs in those areas include older warehouse and manufacturing facilities as well as commercial and industrial buildings along major streets, such as Mission and Valencia.

Figure 3: Areas for Analysis of Commercial/Industrial UMBs

Space in Commercial/Industrial UMBs

Commercial/industrial UMBs represent a stock of about 20 million square feet of building space. Table 4 shows how that space is distributed by location and by use. (In addition, there is ground floor commercial space in some residential UMBs--about 1.2 million square feet. Therefore, total commercial space in UMBs comes to about 21.2 million square feet.)

Generally, the distribution of commercial/industrial building space by location follows the same pattern as the distribution of commercial/industrial buildings. There are a few notable exceptions, reflecting the predominance of small or large buildings in those locations. The share of **building space** in commercial/industrial UMBs in the SSO/SPD, Showplace, and industrial areas is substantially larger than the share of **buildings** in those locations, because many of the larger commercial/industrial UMBs are found there. Conversely, since Chinatown consists primarily of smaller buildings, that area claims only 4% of the space in commercial/industrial UMBs, while Chinatown's share measured in terms of buildings is 9%.

About two-thirds (64%) of the space in commercial/industrial UMBs is in commercial and office use. About two million square feet of that space is in formerly industrial buildings no longer used primarily for manufacturing or distribution. There also is a large amount of space (5.3 million square feet, 26% of the total) in industrial and warehouse use. The other use categories (garage, hotel, theaters and clubs) account for relatively small amounts of space.

The commercial hotel use category includes UMBs with only tourist units. There are about 2,500 tourist units in commercial hotel UMBs. There are an additional 2,900 tourist units in other hotels with both residential and tourist units. Those mixed hotels are categorized as residential UMBs and are discussed later in this chapter.

TABLE 4
SPACE IN COMMERCIAL/INDUSTRIAL UMBS BY LOCATION AND BY USE

Location	Commercial	Office	Commercial in Industrial Buildings	Industrial/ Warehouse	Garage	Hotel	Theaters & Clubs	TOTAL	Percent by Location
C-3-O North	248,325	724,920	0	0	0	5,953	0	979,198	5%
C-3-O South	313,354	881,213	124,434	469,054	12,389	57,210	0	1,857,654	9%
Union Square	1,137,223	527,432	3,532	97,786	0	258,396	30,695	2,055,064	10%
Mid-Market	807,927	218,644	24,299	110,749	14,714	266,550	102,574	1,545,457	8%
Civic Center	187,466	141,173	16,563	148,742	78,490	2,829	27,230	602,493	3%
SSO/SPD/Rincon Hill	103,402	105,530	372,545	1,125,924	22,220	0	0	1,729,621	9%
SLI/SLR/RSD	50,660	69,375	660,101	1,454,919	89,752	89,283	16,790	2,430,880	12%
Showplace	468,980	96,759	305,477	417,066	0	0	0	1,288,282	6%
NE Waterfront	1,044,290	1,087,578	0	73,783	33,696	9,666	31,700	2,280,713	11%
Chinatown	532,922	137,214	0	0	0	6,128	38,061	714,325	4%
Van Ness	174,006	44,617	1,449	31,462	137,628	78,936	55,638	523,736	3%
Polk Street	247,760	17,182	7,484	0	152,307	0	0	424,733	2%
NOMA/SOCAL	171,987	98,274	0	9,077	84,914	96,152	22,867	483,271	2%
NCDs	131,090	24,008	0	0	9,321	0	0	164,419	1%
Neighborhoods	91,224	13,593	0	120,490	128,210	6,210	17,207	376,934	2%
NC-3	249,869	33,426	36,146	86,331	18,682	0	67,986	492,440	2%
Mission Commercial	329,258	45,976	60,191	67,802	46,510	0	33,588	583,325	3%
Industrial Area	59,937	92,630	320,257	1,108,956	8,610	0	0	1,590,390	8%
TOTAL	6,349,680	4,359,544	1,932,478	5,322,141	837,443	877,313	444,336	20,122,935	100%
Percent by Use	32%	22%	10%	26%	4%	4%	2%	100%	

NOTE: In this and subsequent tables presenting summaries and conclusions in terms of the amount of space in commercial/industrial UMBs, the estimates of space are not rounded. The estimates are from the database assembled by the Department of City Planning for the UMB studies. That data base contains building space estimates for each UMB. For consistency in reporting, the summaries of that data base presented in this report are not rounded.

SOURCE: Recht Hausrath & Associates

Characteristics of Commercial/Industrial UMBs by Location: Building Stock and Real Estate Market Factors

Differences in types of tenants and levels of economic activity in areas in which commercial/industrial UMBs are located influence current and potential uses for those buildings. For real estate market analysis of the future for the building stock represented by UMBs, supply factors for various locations (types of space offered by UMBs, policies and zoning controls governing the types of new development and land use change allowed), also are important.

Downtown

The Downtown area includes the following planning areas : C-3-O North, C-3-O South, Union Square and Mid-Market (C-3-R, C-3-G, and C-3-S zoning districts), and Civic Center. Consistent with the zoning, most of the UMBs in the Downtown area are commercial and office buildings. The few residential UMBs are mostly residential hotels and mixed residential/tourist hotels on the outskirts of Union Square and near the mid-blocks of Market Street.

UMBs in the C-3-O North are retail and office buildings, with one small hotel. Compared to the situation in nearby areas such as Chinatown and Jackson Square, where there has not been as much new development, unreinforced masonry buildings are not a dominant building type in the Financial District. In this most densely developed district in the City, there are relatively few sites remaining for substantial amounts of new development. Most of the UMBs are in the conservation districts designated by the Downtown Plan and Article 11 of the City Planning Code, and many are rated significant. In those areas, low height limits and design review discourage new development. This part of the Downtown commands the highest office rents in the City. Older buildings in the area (such as UMBs) provide a somewhat lower-cost alternative for lower-rent paying businesses requiring a Financial District location. In addition, many older buildings have been renovated to high

standards for existing space and command relatively high rents from smaller less rent-sensitive businesses.

The situation for most commercial/industrial UMBs in the C-3-O South contrasts sharply with the picture outlined above for the office district north of Market Street. There is about twice as much space in commercial/industrial UMBs in the C-3-O South. There is more space in both office and retail UMBs; there is also a large amount of space in industrial/warehouse buildings. Many of the older industrial buildings in this area are underutilized or vacant. Some house new uses, including a few shops and restaurants, larger retail outlets, small offices, and commercial services supporting downtown office activity. In marked contrast to the C-3-O north of Market Street, there are many potential sites for substantial amount of new development south of Market Street. Those development sites often represent a combination of several adjacent parcels. Most of those sites encompass one or more UMBs. There are a few UMBs in the C-3-O South along Second Street, where conservation district controls and lower height limits make for new development potential more similar to that north of Market Street.

The Union Square area has a relatively large share (10%) of the space in commercial/industrial UMBs. Over half of that space is in commercial buildings. Tourist hotels are an important component of the UMBs building stock in Union Square. With the exception of a few warehouse UMBs on blocks south of Market Street, all of the UMBs in the Union Square area are governed by conservation district controls; many are significant buildings. There is not much potential for new development, except in the blocks south of Market Street. Generally, the market for existing space is strong in the Union Square area; retail rents can be very high. UMBs in strong retail and hotel locations have been well maintained and upgraded over time.

UMBs in the Mid-Market area and extending through the Civic Center area are distinguished by the variety of building types and uses. Commercial uses predominate; although it is likely that the commercial/industrial UMBs so identified have substantial

amounts of vacant or underutilized upper-story space. The Union Square and Mid-Market areas together account for over half of the tourist hotel units in UMBs. There are fewer upgraded hotels in the Mid-Market area. A substantial number of the UMBs housing theaters, clubs, lodges, and similar facilities for meeting or entertainment are located in this part of the Downtown. The long blocks south of Market Street have an interesting mix of retail, office and theater or club UMBs along the Market Street frontage and a few industrial/warehouse UMBs along the mid-block alleys behind. Vacancies for most types of space are high in this area. The uses in the older space UMBs are generally very-low-rent-paying businesses; demand is not strong for renovated space. There is new development in this area, particularly along Market Street towards Civic Center and Van Ness Avenue. Many of the sites where relatively large new buildings could be developed contain UMBs.

South of Market

The South of Market includes the blocks covered by the South of Market Plan (blocks zoned SSO, SPD, SLI, SLR, and RSD), the Rincon Hill Plan Area, South Beach, other blocks along the waterfront to the south, and Showplace Square.

In the eastern parts of this area (east of Third Street), the UMBs are larger, having once been important industrial and distribution establishments. Many of those UMBs have been vacated by their original users; some are now in office use. Zoning does not encourage new development and many of the UMBs are designated contributory buildings in the South End Historic District. In the SSO district, where recent re-zoning directs office activity, UMBs are the predominant building type. While the UMBs are generally in prime locations for the sub-market for converted space, absorption by office businesses has been slower than expected. Over the long term, however, development patterns are likely to favor intensification of activity in UMBs in this part of the South of Market.

Contrasting to those eastern parts of the South of Market and to Showplace Square, the rest of the area is not characterized by concentrations of UMBs. Instead, there are a large number of commercial/industrial UMBs scattered throughout this area. While some of the larger buildings house distribution and commercial support services along the major South of Market streets there are also a significant number of smaller UMBs (garages and small industrial buildings) opening onto mid-block alleyways. While the UMBs in this part of the South of Market are generally smaller than those in areas to the east or in Showplace Square, the large number of buildings adds up to a large total amount of space. About two million square feet (90% of the total in the western South of Market area) is in buildings designated industrial; about one-third of that space appears to be occupied by non-industrial activities. Most of the space in this part of the South of Market area is in older buildings. Most of the tenants are businesses that pay lower rents, although many of those supporting the most economic activity in the area are willing to pay to be near the downtown businesses they serve. Upgrading existing space to attract higher-rent-paying office, retail, and entertainment uses has been an important feature of the development scene in this part of the South of Market. Recent zoning changes are designed to prohibit much of that activity. Some is likely to continue to occur. UMBs often are likely candidates for upgrading because they are attractive buildings. A provision of the South of Market Plan allows an exemption from the prohibition on office conversion for architecturally or historically significant UMBs in the SLI, SLR, and RSD districts in order to encourage their preservation.

UMBs in the Showplace Square area are generally large, and include showroom facilities as well as distribution facilities. Some of the key buildings defining the development image of this part of the city are UMBs. Wholesale showrooms and related activity have provided a new level of investment for this older building stock.

Northeast Waterfront

This area includes the Jackson Square and Northeast Waterfront districts, Broadway and North Beach neighborhood commercial districts, and a few unreinforced masonry buildings in the Fisherman's Wharf area. UMBs are concentrated in the Jackson Square area, where the predominant buildings types are two- and three-story, small floor-area commercial structures. North of Broadway, UMBs are more likely to be warehouses and industrial buildings with larger floor areas. In both areas, many of the UMBs have been designated architecturally or historically significant. Those old, brick structures are key features of the Northeast Waterfront and Jackson Square historic districts. There are several individually designated city landmarks in this historic area.

Real estate in both areas has benefitted from the expansion of the downtown office sector. Many of the UMBs in Jackson Square and the Northeast Waterfront are occupied by relatively high-rent-paying office and retail tenants. Higher vacancy rates in recent years have been concentrated in the larger new projects, although they have contributed to moderating rent increases in older buildings. Along Broadway and its mid-block alleyways, UMBs are less well-maintained, vacancies are higher, and more marginal operations use the space. Generally, zoning controls limit new development potential to about the amount of space in existing buildings. Throughout the area, older buildings have been added to with one- and two-story penthouses.

Chinatown

Considering commercial/industrial and residential UMBs together, Chinatown has the greatest concentration of unreinforced masonry buildings of any single area in San Francisco. On some Chinatown blocks, the majority of the buildings are UMBs. For the most part, the UMBs are small, multi-story buildings on small lots. Chinatown also has the most UMBs with the use designations for theaters, clubs, and other meeting places. Many

of those UMBs house places of assembly. Most of the UMBs in Chinatown have been identified as significant or contributory to the proposed Chinatown historic district.

There is a greater mix of uses in Chinatown UMBs than in other areas of the City. Many of the buildings, particularly those on major streets such as Grant, Stockton, and Kearny have both commercial and residential uses. Commercial uses are primarily retail stores and restaurants. Commercial uses account for over 500,000 square feet of the space in non-residential UMBs. There are another 300,000 square feet in ground floor commercial space residential UMBs. With all that retail space, the level of economic activity in Chinatown UMBs is high. The high levels of sales support relatively high per-square-foot rents for retail space, in particular on the major shopping and visitor-oriented streets.

Recent re-zoning and strict controls on demolition of existing housing limit the potential for new development in Chinatown. Many existing buildings are larger than the amount of new development allowed under existing zoning. In addition, there are not many vacant or underutilized sites in the area, and larger development sites do not often materialize due to the difficulty of assembling many small parcels into one efficient whole. Moreover, investment practices of the family and district associations that own much of the property in Chinatown often do not favor such consolidation.

Van Ness, Polk, North of Market, and South of California

Commercial buildings are the majority of the UMBs in these areas. Except along Van Ness and at major intersections elsewhere, most of the buildings are one- and two-story structures, occupied by neighborhood-serving uses. Some of those older buildings in certain locations have large amounts of vacant space; some UMB storefronts suffer from high tenant turnover as they offer space for low-rent paying start-up businesses. At the same time, other ground floor restaurants and shops do quite well and support relatively high per-square-foot rents.

There are a large number of garage UMBs in the Polk/Van Ness corridor--40% of all of the UMBs of this building type. (Many of the rest form a major component of the stock of UMBs scattered in neighborhoods throughout the City.) About 25% of the space in UMBs in the Polk/Van Ness corridor is in garage facilities. The garages date from the days of livery stables and the early automobile; they continue to be used for parking and auto repair.

In this section of the City, Van Ness Avenue is the only location where much new development has occurred. Many of the commercial/industrial UMBs are large relative to the amount of new commercial development allowed. Consequently, there is not much incentive for major new commercial development, since new projects have to include large amounts of housing as well.

Mission/Potrero/South Bayshore

Most of the commercial/industrial UMBs in the southeastern part of the City are located in the Mission District. Most have large floor-plates and are one or two stories in height. Buildings with large-scale retail stores and other commercial and industrial uses, including numerous auto repair and auto parts supply shops, are located along Mission and Valencia Streets. In those locations, there have not been many changes in use of UMBs.

Industrial and warehouse buildings are located in the older Mission industrial zone west of Highway 101. The Lower Potrero/Central Waterfront area along Third Street has a similar collection of brick industrial buildings. (There are only a few isolated commercial/industrial UMBs in the South Bayshore area.) In recent years, there have been more changes in use for some of these buildings, as many of the facilities no longer serve the needs of the original occupants. While some buildings appear vacant or have not been well-maintained, others support substantial economic activity, often housing several businesses. New uses in industrial/warehouse UMBs in this part of the City include small manufacturing, crafts, and repair businesses, wholesale furnishings and design-related

businesses, live-work, and arts-related businesses. Overall, space in UMBs is only about 10% of the total building space in the older Mission and Potrero industrial areas. As in the South of Market, however, because of the architectural characteristics of the brick construction, UMBs appear to be a larger proportion of the space used by office and other new economic activities.

A report published by the Department of City Planning in December 1989, as background to the Residence Element update, presented an inventory of "housing opportunity sites" in the City's eastern industrial districts. That report defined a category of "soft sites" for housing and presents estimates of the number of housing units that could be accommodated on those sites. In the North Mission industrial area, 60% of the total housing unit potential estimated for both undeveloped sites and soft sites are sites with unreinforced masonry buildings. In the Central Waterfront area, sites with UMBs could accommodate about 10% of the total potential housing units.

Neighborhoods

Five percent of the total space in commercial/industrial UMBs is located in neighborhood districts west of Van Ness Avenue. The UMBs are not concentrated in any one particular area. There are one and sometimes three or four buildings in each of the named neighborhood commercial districts. There are more along streets such as Geary and Fillmore with high levels of traffic and commercial activity. There are also isolated UMBs in smaller-scale neighborhood commercial areas. The uses in neighborhood UMBs depend on the character of the area. Shops and restaurants are the primary uses in the resident-oriented districts. Along the more well-travelled corridors, garages and smaller warehouse and industrial buildings appear in addition to commercial UMBs. The commercial UMBs in those areas house businesses drawing customers from beyond the immediate neighborhood: car dealers, auto parts suppliers, gas stations, furniture stores, and building materials stores.

How Space in Commercial/Industrial UMBs is Used

Employment

About 41,000 people work in commercial/industrial UMBs (see Table 5). Another 3,200 people work in the commercial space (primarily ground floor retail businesses) in residential UMBs, bringing total employment associated with unreinforced masonry buildings in San Francisco to 44,000.*

Most people working in commercial/industrial UMBs work in commercial and office uses. There are about 32,000 people (72% of total employment) working in those types of uses. Compared to their share of either buildings or space, the share of total employment in UMBs in commercial and office uses is even higher. This is attributable to the relatively high employment densities for those activities. About 7,000 people work in UMBs in industrial/warehouse use. While that estimate is likely to be on the high side since there is probably more vacant space in the industrial class of UMBs than assumed for this analysis, the general conclusion that UMBs house a substantial number of the City's jobs in the traditional manufacturing and distribution business activities is valid.

The 44,000 jobs in UMBs in San Francisco are about 7.5% of total jobs in San Francisco (estimated at about 592,000 in 1989, using the most recent data from the State Employment Development Department, adjusted to account for the self-employed).

*For the employment estimates, commercial and industrial space in UMBs was categorized by use and location. Vacant space was estimated using vacancy rate assumptions sensitive to differences among uses and locations. (The vacancy assumptions are probably low for some uses and locations, but there is not enough specific information about the UMBs to account for a larger amount of vacant space.) Employment density factors derived from the C-3 District Employer Survey, the South of Market/Folsom Employer Survey, and the South Bayshore Survey were applied to the estimates of occupied space by use and location (to the number of hotel rooms in the case of tourist hotels). In an effort to be sensitive to the particular buildings under study (i.e., older buildings, sometimes only a small part of the overall building stock in an area) survey data were manipulated to be more representative of the likely level of activity in UMBs.

TABLE 5
ESTIMATED EMPLOYMENT IN UMBS BY USE

Use	Space	Employment	Percent of Total Employment
Commercial/ Industrial UMBs			
Commercial	6,349,680	16,100	36%
Office	4,359,544	12,800	29%
Commercial in Industrial Bldgs.	1,932,478	2,900	7%
Industrial/ Warehouse	5,322,141	7,000	16%
Garage	837,443	500	1%
Hotel	877,313 (2,466 rooms)	1,100	3%
Theaters & Clubs	444,336	600	1%
Subtotal	20,122,935	41,000	93%
Residential UMBS	1,209,130	3,200	7%
TOTAL	21,332,065	44,200	100%

SOURCE: Recht Hausrath & Associates

Types of Businesses in UMBs

There are about 4,500 businesses in UMBs in San Francisco.* Most (about 75% of the total) are in commercial/industrial buildings. The other 25% are small, primarily neighborhood-serving businesses in the ground floors of residential UMBs.

Information about the characteristics of the businesses occupying UMBs comes from categorization of business tenants by Standard Industrial Classification. (See Table 6). (The SIC data is not complete for all UMBs, but the sample is large enough to establish a clear pattern of business types. The SIC data include business establishments in residential UMBs. Utility meter reports from the Pacific Gas & Electric Company are the source.)

Almost half of the businesses for which data are available are classified as retail businesses, by far the largest single group. Within the retail category, one-third are eating and drinking places and another quarter are miscellaneous retail shops. Food stores and clothing stores also are well-represented in UMBs. Businesses in the services category (including personal services, business and professional services, repair and other services) are also common in UMBs. The business and professional sub-group includes office and related establishments: advertising, graphic designers, attorneys, architects, engineers and other professional services. There also are a substantial share of businesses representing a variety of other service activities, including medical offices, commercial photography and photo-finishing, entertainment, and social services. In the personal services category, UMBs appear to house a substantial number of coin-operated laundries and dry-cleaning establishments. The data for the repair services SIC complements the land use categorizations, indicating mostly auto-related repair establishments, in addition to the

*The estimate of the number of businesses in UMBs is based on counts from the Pacific Bell reverse directory for addresses identified with unreinforced masonry buildings. The directory provided counts for 896 of the 1,171 commercial/industrial UMBs and 453 of the 514 residential UMBs that have commercial space (all residential UMBs except dwellings and flats without commercial space and apartments without commercial space). Those counts were treated as a sample and analyzed by use and location. To estimate the number of businesses for the total population of commercial/industrial UMBs and residential UMBs with commercial space, the sample medians by area and use were used as estimates for those UMBs without counts from the reverse directory.

TABLE 6
TYPES OF BUSINESSES IN UMBS

Business Type	(SIC Code)	Number of Businesses	Percent of Total
Construction	(15,17)	19	1%
Manufacturing	(20-39)	127	7%
Transportation & Communications	(40-49)	57	3%
Wholesale Trade	(50,51)	77	4%
Retail Trade	(52-59)	848	48%
Finance, Insurance & Real Estate	(60-67)	69	4%
Personal Services	(72)	110	6%
Business & Professional Services	(73,81,87)	172	10%
Repair Services	(75,76)	79	4%
Other Services	(01,07,70,78-80, 82,83,86,89,91-97)	233	13%
TOTAL		1,791	100%

NOTE: The number of businesses by SIC category shown in the table represents the sample of UMBs for which data were available from PG&E utility meter reports. The sample of 1,791 business establishments, while not complete for all UMBs, is large enough to establish a pattern of business type. That pattern, represented by the percent of total column, is the important descriptive information in this table.

SOURCE: Pacific Gas & Electric Company

sizable group of auto supply stores identified in the retail SIC. The manufacturing SIC has a larger share of the businesses in UMBs than does wholesaling, transportation, or construction. With 48 different types of manufacturing specified in the detailed SIC codes, the data indicate considerable variety among the manufacturing establishments in UMBs. Apparel manufacturing and printing and publishing stand out with large numbers of businesses in each group.

While the SIC data for UMBs describe types of businesses common in San Francisco, as a group, the class of businesses in UMBs has some distinctive characteristics. The profile is one of small, independent businesses, primarily oriented to customer contact. Fully three-quarters of the businesses for which there are SIC data are identified as retail, personal service, repair service, business service, and other service establishments.

RESIDENTIAL UMBS

There are about 800 unreinforced masonry buildings with residential use designations. Some have commercial space in addition to residential units. Those buildings are separately identified (see Table 2). That table also shows how the residential UMBs are categorized according to the type of housing they provide. While tourist hotels are classified as commercial UMBs, buildings with a mix of residential and tourist units are classified as residential.

Location of the Buildings

As is the case with the commercial/industrial UMBs, residential UMBs are located throughout the City, although they are more concentrated in a few key areas. Table 7 presents the distribution of residential UMBs by location. Note that the areas identified here are not the same as those used to locate commercial/industrial UMBs. Residential

TABLE 7
RESIDENTIAL UMBS BY LOCATION

Location	Number of UMBS	Percent of Total
Bush Corridor	180	23%
Chinatown	207	26%
North Beach	30	4%
Downtown	12	1%
North of Market (NOMA)	133	17%
NOMA 6th Street	36	5%
South of Market (SOMA)	12	1%
SOMA 6th Street	23	3%
Civic Center/South Van Ness	9	1%
Mid Van Ness	22	3%
North Van Ness	36	5%
Mission	26	3%
Outlying	62	8%
TOTAL	788	100%

NOTE: The map in Figure 4 delineates the areas listed above. These areas are used for analysis of residential UMBs in this study.

SOURCE: Recht Hausrath & Associates

UMBs have been grouped according to recognized neighborhood areas.* The map in Figure 4 delineates the areas used for analysis of residential UMBs. It covers those areas

*The locations defined for analysis of residential UMBs generally correspond to planning areas. More importantly, they reflect divisions between neighborhoods having significant concentrations of UMBs. The divisions are based largely on differences in residential rents.

Figure 4: Areas for Analysis of Residential UMBs

in the eastern part of the City where UMBs are concentrated.

Three areas stand out with large shares of the residential UMBs: Chinatown, Bush Street Corridor, and North of Market. Including North of Market-6th Street, these areas account for about 70% of all residential UMBs. Generally, there are not many residential UMBs in the South of Market area since commercial and industrial land uses predominate. There is, however, a significant concentration in a relatively small area along Sixth Street between Market and Howard. Residential UMBs are scattered in other parts of the City. Most are in the northeast, where prominent single-family homes and apartment buildings are of brick construction.

Housing Units in Residential UMBs

Type of Housing

There are about 21,755 housing units in UMBs in San Francisco. Table 8 shows how those units are distributed by location and by type of housing.

For the most part, the distribution of units by location parallels the distribution of buildings by location. The locations in which the percentages diverge are those where buildings tend to have either particularly large or small numbers of units. Chinatown, with small residential buildings, has 15% of the housing units and 26% of the buildings. North of Market areas are characterized by large residential buildings with many units; the share of housing units in those areas is greater than the share of residential UMBs in the same areas. The predominance of single-family homes in outlying areas is reflected in the relatively small share of total units in those locations, compared to the larger share measured in terms of buildings.

TABLE 8
HOUSING UNITS IN RESIDENTIAL UMBS BY LOCATION AND USE

Location	Dwellings & Flats w/o Commercial	Flats with Commercial	Apartments without Commercial	Apartments with Commercial	Residential Hotels	Mixed Res. & Tourist Hotels	TOTAL	Percent by Location
Bush Corridor	18	22	1,985	2,178	609	474	5,286	24%
Chinatown	16	71	706	148	2,089	260	3,290	15%
North Beach	6	8	74	32	599	185	904	4%
Downtown	0	0	85	31	70	336	522	2%
NOMA	4	3	1,460	1,215	910	1,323	4,915	23%
NOMA 6th Street	0	0	264	549	752	497	2,062	10%
SOMA	0	1	149	41	113	32	336	2%
SOMA 6th Street	0	0	119	109	506	765	1,499	7%
Civic Center/ So. Van Ness	0	0	189	100	0	154	443	2%
Mid Van Ness	12	14	116	257	262	37	698	3%
No. Van Ness	32	0	247	319	84	0	682	3%
Mission	3	24	289	62	66	65	509	2%
Outlying	81	2	247	160	119	0	609	3%
TOTAL	172	145	5,930	5,201	6,179	4,128	21,755	100%
Percent by Use	1%	1%	27%	24%	28%	19%	100%	

NOTE: In this and subsequent tables presenting summaries and conclusions in terms of the number of residential units in residential UMBs, the estimates of units are not rounded. The estimates are from the data base assembled by the Department of City Planning for the UMB studies. That data base contains estimates of residential units for each residential UMB. For consistency in reporting, the summaries of that data base presented in this report are not rounded.

The housing units counted in this table include only those designated for residential use. In addition, there are about 2,900 units designated for tourist use in mixed residential and tourist hotels. There also are about 2,500 tourist units in commercial UMBs categorized as tourist hotels.

SOURCE: Recht Hausrath & Associates

As expected, almost all (98%) of the housing units in UMBs are in the higher-density housing types: apartments and residential hotels. With about 11,000 units, apartment buildings account for half of all housing units in residential UMBs; residential hotels (including those with some tourist units) account for another 10,000 residential units. Other housing types (single family homes and flats) account for only about 2% of total housing units in residential UMBs.

The counts of housing units do not include units designated for tourist occupancy. There are about 2,900 such tourist units in UMBs categorized as mixed residential and tourist hotels. In addition, there are about 2,500 tourist units in commercial UMBs categorized as tourist hotels (see Table 5). In total, there are about 5,400 tourist units in unreinforced masonry buildings. Some of those tourist units may be used as residential units. Their designation as tourist units places them in a different class for regulatory purposes, however.

Units in unreinforced masonry buildings are a large share of total residential hotel units in San Francisco. The most recent status report on the San Francisco Residential Hotel Unit Conversion and Demolition Ordinance, published by the Department of City Planning in March 1988, counts 21,400 residential hotel units in the City in 1986. (This number includes the vacant residential units in residential hotels; it does not include tourist units.) About half of those units are in UMBs. In certain locations such as Chinatown and the Sixth Street Corridor north and south of Market Street, virtually all residential hotel units are in unreinforced masonry buildings.

Relative Importance to the Housing Stock

Overall, housing units in UMBs represent about 7% of the City's housing stock. In certain neighborhoods in and around the downtown area, however, units in UMBs represent a much larger share of the housing. Table 9 compares the number of housing units in residential UMBs in selected neighborhoods to total housing units in those neighborhoods, as measured

TABLE 9
UNITS IN RESIDENTIAL UMBS AS A PERCENT OF TOTAL HOUSING UNITS: SELECTED NEIGHBORHOODS

Neighborhood	(Census Tracts)	Units in UMBS	Total Units (1980 Census)	Units in UMBS as Percent of Total
Chinatown	(106, 107, 113-115, 118)	4,066	6,573	62%
Downtown	(117)	1,039	1,342	77%
North of Market	(122-125)	7,804	14,986	52%
South of Market	(176.01, 178, 179.01, 180)	1,835	5,630	33%
Bush Corridor	(119-121)	3,962	8,844	45%
TOTAL		18,706	37,375	50%

NOTE: The UMBs have been grouped according to census tract boundaries for comparison with totals from the 1980 Census. Thus, the neighborhood counts for UMBs in this table do not correspond with the summaries by geographic area shown in Table 8.

SOURCE: Recht Hausrath & Associates and 1980 Census of Population and Housing: Census Tracts, San Francisco - Oakland SMSA, Table H-1

in the 1980 Census. (Although the 1980 Census is 10 years old, it is an appropriate basis for the comparison because there has not been much change in the housing supply in these neighborhoods.)

The majority (about 85%) of the housing units in residential UMBs are found in Chinatown, Downtown, North of Market, South of Market, and the Bush Corridor. In those neighborhoods, units in UMBs are a significant component of the total housing supply, accounting for over half of the units in Chinatown, Downtown, and North of Market; 45% of the total in the Bush Corridor, and one-third of the total in the South of Market. (As

noted above, many South of Market units are even more concentrated on blocks along 6th Street.)

The neighborhoods are notable for their concentration of high-density, rental housing, primarily in the lower-rent ranges. Compared to housing in other parts of the City, the housing stock in those neighborhoods generally consists of smaller units in larger buildings. Chinatown, where there are many small but high-density residential buildings, is the exception. The selected neighborhoods identified in the table are also where most residential hotels are located.

How Space in Residential UMBs is Used

Population

About 27,000 people live in unreinforced masonry buildings in San Francisco (see Table 10).* About 40% of those people live in residential hotel units. The population in residential hotels is an important component of the UMB residential population and represents a large share of the total population in San Francisco living in residential hotels. Overall, however, unreinforced masonry buildings house only about 4% of the City's population. The proportion of the City's population living in UMBs is smaller than the proportion of the City's housing units in UMBs because of the smaller average unit sizes and, consequently, smaller average household sizes associated with UMBs. The housing stock represented by UMBs has proportionally more multi-family buildings with smaller

*For the population estimates, the residential units in residential UMBs were categorized by housing type and location. Vacant units were estimated using vacancy rate assumptions that were sensitive to the type of housing and its location. The vacancy rate assumptions for residential hotel units were based on the unit usage reports filed annually by residential hotel owners with the BBI Division of Apartment and Hotel Inspection (DAHI). Persons-per-household factors were developed for each location from 1980 Census data, to cover all housing types except residential hotels. Those factors were adjusted to account for citywide changes in household size since 1980, as estimated by the California Department of Finance. The Department of City Planning provided an estimate of average persons-per-household for residential hotel units. That estimate was not sensitive to location. The persons-per-household factors were applied to the estimate of occupied housing units (households) by type for each location, as appropriate.

TABLE 10
ESTIMATED POPULATION IN RESIDENTIAL UMBS BY LOCATION AND TYPE OF HOUSING

Location	Dwellings/ Flats/Apts	Residential Hotel Units	TOTAL	Percent by Location
Chinatown	2,191	1,391	3,582	**13%**
North Beach	260	896	1,156	**4%**
Downtown	170	486	656	**3%**
North of Market	3,365	2,321	5,686	**21%**
NOMA Sixth St.	807	1,488	2,295	**9%**
Bush Corridor	5,567	1,250	6,817	**25%**
North Van Ness	1,018	120	1,138	**4%**
Mid Van Ness	641	331	972	**4%**
Civic Center	415	213	628	**2%**
South of Market	303	174	477	**2%**
SOMA 6th St.	340	1,295	1,635	**6%**
Mission	892	99	991	**4%**
Northeast	598	0	598	**2%**
Northwest	14	0	14	**0%**
Central	250	108	358	**1%**
Southeast	18	0	18	**0%**
Southwest	28	0	28	**0%**
TOTAL	16,877	10,172	27,049	**100%**
Percent by Housing Type	**62%**	**38%**	**100%**	

SOURCE: Recht Hausrath & Associates

units than does the housing stock in the City overall; the large residential hotel component of the UMB housing stock also contributes to the small average household size.

As noted above, a large proportion of the City's lower-rent housing stock is in UMBs. Many of the occupants have limited options for housing: low-income households, recent immigrants and other newcomers, the elderly, unemployed people, and others supported with public assistance. There is no source of data describing the characteristics of the residents of UMBs. Nevertheless, because residential UMBs are so concentrated in neighborhoods surrounding the downtown and units in unreinforced masonry buildings are

large components of the housing stock in those areas, Census data provide an indication of the characteristics of residents of UMBs in those areas. While 1980 Census data is now 10 years old, it is the best comprehensive data source until 1990 Census data are summarized. For the characteristics of interest here, for areas in which there has not been much change in the existing housing stock, it remains a reasonable source of illustrative data.

Table 11 summarizes selected indicators from the 1980 Census for the neighborhoods where units in unreinforced masonry buildings are a large proportion of the housing stock, comparing the indicators for those areas to the averages for the City as a whole. The comparison is a striking illustration of the distinguishing characteristics of these particular neighborhoods. The conclusions are not surprising, although, in many instances, the large disparity between the descriptive percentages for the citywide average and the neighborhood characteristics is notable.

For the most part, the neighborhoods have higher-than-average shares of the population at the lower-end of the income distribution and higher-than-average shares of sub-standard housing. The neighborhoods are distinguished by the share of the residents with special needs: higher-than-average shares of the elderly, households on public assistance, people living below the poverty level, and the unemployed. While a large proportion (66%) of all households in San Francisco consists of renters, an even larger share, virtually all households in the neighborhoods where UMBs are concentrated, are renters, and a disproportionate share of the renters are low-income households. The housing tends to be crowded, and in some areas, a substantial share of the units lack complete plumbing. The concentration of residential hotels contributes to the latter statistic. Among the neighborhoods with high concentrations of residential UMBs, the Bush Corridor has proportionately fewer residential hotels. The housing stock there, consisting primarily of large apartment buildings, attracts relatively higher-rent-paying tenants.

TABLE 11
CHARACTERISTICS OF POPULATION AND HOUSING IN NEIGHBORHOODS WHERE UMBs ARE CONCENTRATED

Indicator	San Francisco Average	UMB Neighborhoods	
		Higher than Citywide Average	Lower than Citywide Average
% Population 65 & older	15%	Chinatown, NOMA, 24% SOMA, Bush Corridor 19% Downtown 17%	None
% Households Headed by Person over 65	23%	Chinatown 33% NOMA, SOMA 29%	Downtown 22% Bush Corridor 22%
% Households with Public Assistance Income	11%	SOMA 33% NOMA 23% Chinatown 19% Downtown 16%	Bush Corridor 7%
% Families with Income below Poverty Level	10%	NOMA 32% Bush Corridor 24% SOMA 23% Chinatown 12%	Downtown 2%
% People with Income below Poverty Level	14%	NOMA, SOMA 30% Downtown 29% Bush Corridor 25% Chinatown 23%	None
% Unemployed	6%	SOMA 15% Downtown 14% NOMA 12% Bush Corridor 8%	Chinatown 6%

(Continued on Next Page)

TABLE 11 (Continued)
CHARACTERISTICS OF POPULATION AND HOUSING IN NEIGHBORHOODS WHERE UMBs ARE CONCENTRATED

Indicator	San Francisco Average	UMB Neighborhoods	
		Higher than Citywide Average	Lower than Citywide Average
% Renter Households	66%	Downtown, NOMA 100% SOMA 98% Bush Corridor 94% Chinatown 90%	None
% Renter Households with Incomes < $10,000 (1979 Income)	39%	SOMA 72% NOMA, Downtown 69% Chinatown 52% Bush Corridor 51%	None
% Renter Households with Incomes <$10,000 (1979 Income) Spending more than 30% of Income for Housing	72%	Bush Corridor 76%	NOMA 71% Downtown 61% Chinatown 54% SOMA 49%
% Units with More than 1 Person per Room	7%	Chinatown 22% Downtown 13% NOMA, SOMA 11% Bush Corridor 8%	None
% Units with No Plumbing	4%	SOMA 64% Downtown 42% Chinatown 23% NOMA 19% Bush Corridor 5%	None

SOURCE: Recht Hausrath & Associates, based on 1980 Census of Population and Housing: Census Tracts - San Francisco Oakland SMSA, Tables P-1, P-10, P-11, H-1 and H-8.

Commercial Space in Residential UMBs

As noted above in the discussion of total employment associated with unreinforced masonry buildings, some residential UMBs have ground floor commercial space. There is about 1.2 million square feet of such space; most located in Chinatown, the North of Market area, and the Bush Street Corridor. Almost one-third of this ground floor commercial space is in Chinatown, reflecting the mixed-use character of many of the buildings on the main streets of that district. About 3,000 people work in the commercial space in residential UMBs. That amount is just over 7% of the total employment in UMBs, a substantial part of the total.

III. ALTERNATIVE SEISMIC RETROFITTING REQUIREMENTS AND COSTS

This chapter briefly describes the seismic retrofitting alternatives that are evaluated in this report. It then focuses on the costs of the retrofitting alternatives. Total costs per square foot are presented that include the base costs for retrofitting developed by the structural engineers plus other costs to building owners of satisfying the alternative requirements. The estimates of total costs are used in assessing the financial burden that retrofitting requirements would place on building owners (in Chapter IV) and for considering the implications for building outcomes (in Chapter V).

SUMMARY DESCRIPTION OF RETROFITTING ALTERNATIVES

The City of San Francisco is studying five alternative retrofitting levels to address the life-safety hazard posed by unreinforced masonry buildings in the event of an earthquake. Out of that effort, a seismic retrofitting program involving combinations or variants of the alternatives will be devised. The three alternatives for mandatory strengthening of the building structure are the subject of this report. The other alternatives are to: 1) have no requirements besides those programs currently in effect, and 2) encourage voluntary seismic upgrade. The strengthening alternatives are described in detail in Seismic Retrofitting Alternatives for San Francisco's Unreinforced Masonry Buildings: Section 3: Retrofit Project Descriptions, a report prepared by Rutherford & Chekene for the Department of City Planning. The key features of the alternatives are summarized here, drawing on the engineers' text.

Alternative 1: Out-of-Plane Wall Strengthening

Sometimes referred to as Anchorage and Interconnection, this alternative would require a relatively low level of seismic strengthening. Unreinforced masonry walls would be

anchored to floors and roofs, and work would be done to prevent walls from collapsing, i.e., to prevent out-of-plane failure. Typically, this work would be confined to perimeter walls, though strengthening would also be required of the unreinforced interior walls of larger buildings. The level of construction activity would be similar to that of a small remodel.

Alternative 2: Uniform Code for Building Conservation (UCBC) - Appendix Chapter 1

This alternative adopts the Model Ordinance Version 7 under preparation by the Structural Engineers Association of California. The ordinance is similar to the UMB retrofitting ordinance implemented in Los Angeles. This alternative would supplement the strengthening required in Alternative 1 with structural evaluation potentially leading to strengthening of other building elements, including floors and roofs, and, in some cases, in-plane strengthening of exterior walls. The need for in-plane elements would represent a significant increase in construction activity compared to Alternative 1. Generally, the level of activity would be beyond a remodel; there might be extensive removal of finishes, installation of plywood shear walls, new finishes and possible installation of structural steel. In some cases, new masonry or concrete walls, or gunite over existing walls, would be required.

Alternative 3: San Francisco Building Code - Section 104(f)

This alternative would make mandatory the level of seismic retrofitting now required by the San Francisco Building Code in any building undergoing substantial addition, alteration, or intensification of use. The wall anchors and out-of-plane strengthening required by Alternative 1 would almost always be supplemented by work on floors and roofs and by in-plane strengthening of exterior masonry walls. A high level of retrofitting would be required for UMBs, representing a substantial escalation in construction activity, compared to the other alternatives. Extensive work with structural steel or concrete and, potentially, new foundations would be far beyond a remodel.

COSTS OF ALTERNATIVE RETROFITTING REQUIREMENTS

Base Costs

Costs have been estimated for the three alternative levels of seismic strengthening by Rutherford & Chekene (R&C), structural engineers. Cost estimates were developed by alternative, for each of the 15 building prototypes representative of San Francisco UMBs (see Table 1 and Figure 2 in Chapter II of this report). Table 12 identifies the costs per square foot for retrofitting and restoring a moderate level of finish to vacant UMBs.* These base costs include all material, equipment, and labor with the appropriate subcontractor's markup, general conditions, general contractor's overhead and profit, bond and insurance fees, and contingencies and escalation allowances.

The cost estimates are intended to be accurate as an average cost per square foot for space in buildings of each prototype. As input for the economic analysis, they provide a useful measure of the general magnitude of costs for different types of buildings and of the differences in costs among alternatives.

Review of the base costs indicates large variation in costs per square foot depending on the building prototype. Generally, the higher costs per square foot are for the smaller building prototypes (those with smaller building footprints and/or smaller total area). Among larger buildings, one-story and industrial prototypes generally have lower costs per square foot while taller office/commercial and residential prototypes have higher costs.

*Although it is now considered likely that most UMB retrofit work would trigger State-mandated requirements for disabled access, those requirements and their associated costs were not included in the cost estimates developed for the Alternatives by the structural engineers. Information describing the details of building layouts that would be required to develop reasonable cost estimates for disabled access requirements is not now available as a part of the UMB database.

TABLE 12
SEISMIC RETROFITTING ALTERNATIVES:
BASE COSTS PER SQUARE FOOT BY PROTOTYPE

Prototype	Alternative 1	Alternative 2	Alternative 3
A - small, one story	$9.84	$10.71	$14.15
B - large, one story	5.59	7.87	9.30
C - irregular, residential	5.04	8.18	13.72
D - irregular, non-residential	5.68	7.95	14.67
E - small, industrial	9.21	10.90	15.26
F - large, industrial	4.21	7.57	9.48
G - small, 2-3 story, office/commercial	12.31	13.66	18.44
H - large, 2-3 story, office/commercial	5.55	8.23	11.18
I - small, 4+ story, office/commercial	9.05	15.17	22.14
J - large, 4+ story, office/commercial	4.59	8.63	14.45
K - small, 2-3 story, residential	11.80	12.95	18.55
L - large, 2-3 story, residential	6.84	8.76	12.51
M - small, 4+ story, residential	6.55	15.83	18.81
N - large, 4+ story, residential	4.23	9.68	16.50
O - assembly	8.01	11.01	15.86
Overall Weighted Average	**$5.75**	**$9.37**	**$13.93**

NOTE: Costs are in December 1989 dollars. This table presents average costs per square foot by building prototype for retrofitting and restoring a moderate level of finish to vacant URMs. Actual costs will vary considerably from building to building. The base costs include all material, equipment, and labor with the appropriate subcontractor's markup, general conditions (including field supervision, field engineering by the contractor, superintendent's costs, and other contractor expenses), general contractor's overhead and profit, bond and insurance fees, and contingencies and escalation allowances.

SOURCE: Rutherford & Chekene, 1990, Section 4: Cost Summary and Report, see particularly Table 4.1, p. 4-1 and pp. 4-2 - 4-6.

Generally, costs per square foot are lowest under Alternative 1 and highest under Alternative 3. The range across alternatives is not uniform for all prototypes, however. Although the costs for Alternative 2 are between those for the other two alternatives, it depends on the prototype whether the costs for Alternative 2 are more similar to those for Alternative 1 or to those for Alternative 3 or fall midway in between. Overall, the weighted average base costs per square foot for all space in UMBs indicate that Alternative 2 would be about 1.6 times as costly as Alternative 1. Alternative 3 would be about 1.5 times as costly as Alternative 2 and about 2.4 times as costly as Alternative 1.

Total Costs

Total costs per square foot were estimated by Recht Hausrath & Associates (RHA) to include the base costs in Table 12 plus other costs to building owners of satisfying the alternative seismic retrofitting requirements. The total costs per square foot were estimated for use in assessing the financial burden that retrofitting requirements would place on building owners and for considering the implications for building outcomes.

Total costs per square foot were estimated by accounting for the following cost items as applicable, in addition to the base costs identified above:

- cost premium for retrofitting with occupants in place;
- cost premium for historically or architecturally significant buildings;
- engineering and architectural design fees and plan checking and permit fees;
- lost revenues to owners during retrofitting and during re-leasing;
- owner's project management and administration costs; and
- relocation costs to owners of residential UMBs covered by the Residential Rent Stabilization Ordinance.

Appendix 1 provides background on the estimates for each of the above components of cost.

The estimates of total cost depend on whether the building would be occupied during retrofitting (in which case a cost premium for occupancy would apply) or vacant (in which case there would be lost revenue during retrofitting and until the space is re-leased). The engineering analysis provides a description of construction characteristics and indicates that there would be situations where constant, serious disruption to occupants would result. It is reasonable to assume that those situations would be the ones in which UMBs would be the most likely to be vacated for the retrofitting work. Based on the engineering assessment, the seismic retrofitting work under Alternative 1 could be expected to be done with occupants in place. Under Alternatives 2 and 3, there would be situations (about one-third of the UMBs for Alternative 2 and about one-half of the UMBs for Alternative 3) where retrofitting would not be able to be done with occupants in place (or could be done only with serious disruption to occupants). Generally, the physical disruption would be greatest in the smaller buildings where construction activities could not easily be separated from occupants. Table 13 presents assumptions by building prototype regarding retrofitting with occupancy or vacancy based on the engineering analysis.

The engineering analysis also indicates that when the building is occupied during retrofitting, there would be temporary displacement from certain areas during construction. This could result in somewhat reduced revenues to owners during the construction period because tenants might pay less rent to compensate for displacement/disruption, and/or owners might maintain higher than normal vacancies (as existing tenants leave) to allow for temporary relocation of tenants within a building. These lost revenues would be in addition to cost premiums for retrofitting with occupancy.

In addition to the engineering assessment of disruption, RHA considered the economic incentives to owners faced with the choice of doing the retrofitting work with an occupied or vacant building. The conclusions of the economic analysis closely correspond with those of the engineering assessment. Generally there would be cost incentives for owners of **smaller** UMBs to do the retrofitting with a vacant building. For smaller buildings, the

TABLE 13
ASSUMPTIONS REGARDING RETROFITTING
WITH OCCUPANCY OR VACANCY

Prototype	Alternative 1	Alternative 2	Alternative 3
A - small, one story	O	V	V
B - large, one story	O	O	O
C - irregular, residential	O	O	O
D - irregular, non-residential	O	O	O
E - small, industrial	O	V	V
F - large, industrial	O	O	O
G - small, 2-3 story, office/commercial	O	V	V
H - large, 2-3 story, office/commercial	O	O	O
I - small, 4+ story, office/commercial	O	O	V
J - large, 4+ story, office/commercial	O	O	O
K - small, 2-3 story, residential	O	V	V
L - large, 2-3 story, residential	O	O	V
M - small, 4+ story, residential	O	O	V
N - large, 4+ story, residential	O	O	O
O - assembly	O	O	O

O = Building occupied during retrofitting
V = Building vacant during retrofitting

NOTE: Assumptions shown here about whether buildings would be occupied or vacant during retrofitting are based on the engineers' description of construction characteristics and the degree of disruption during construction (see R & C, 1990, Section 3.5 Retrofit Descriptions, pp. 3-74 - 3-115). It is assumed that buildings would be vacant during retrofitting when construction would represent constant, serious disruption to occupants. In all other situations, it is assumed that buildings would remain occupied during retrofitting, allowing for displacement from certain areas while construction occurs.

SOURCE: Recht Hausrath & Associates based on Rutherford & Chekene, 1990

construction cost savings of retrofitting a vacant building compared to an occupied building(the savings of the cost premium for occupancy) generally are larger than the lost revenues resulting from vacancy during the construction period and for a time thereafter to allow for re-leasing. This applies in most cases except for buildings with high rents such as the rents for retail uses in desirable locations. For **larger** buildings, the economics suggest that buildings remain occupied during construction as long as substantial portions of the buildings can continue to be occupied. For larger buildings, the cost savings of retrofitting a vacant building (the savings of the cost premium for occupancy) are generally less than the costs of lost revenues resulting from vacancy. For larger buildings compared to smaller ones, the duration of construction is longer (so that lost revenues are greater) and construction costs and premiums are lower on a per square foot basis (so that cost premiums for occupancy are less).

Based on both the engineering and economic analysis, the estimates of total cost in this analysis include the assumptions shown in Table 13. They are the following:

- Alternative 1: all buildings remain occupied during retrofitting (allowing for displacement from certain areas while construction occurs);
- Alternative 2: buildings of prototypes A, E, G, and K are vacant during retrofitting and the rest of the buildings remain occupied (allowing for displacement from certain areas while construction occurs);
- Alternative 3: buildings of prototypes A, E, G, I, K, L, and M are vacant during retrofitting and the rest of the buildings remain occupied (allowing for displacement from certain areas while construction occurs).

Total costs also depend on whether the UMB is historically or architecturally significant. Construction premiums in both cost and time would apply to buildings so designated. The premiums vary, depending on the alternative and the building prototype. For this analysis, about 40% of the buildings received historic premiums.

Total costs include costs for engineering and architectural design and plan checking and permit fees estimated at 10% of base costs plus cost premiums for occupancy and/or historic buildings as applicable. Building owners' costs for project management and administration also are included in total costs. This category includes the time and costs to owners of dealing with construction activities and building occupants, estimated based on the size of the building and the duration of retrofitting.

Relocation costs to owners of residential UMBs covered by the Residential Rent Stabilization Ordinance are included for situations in which it is assumed that buildings would be vacant during retrofitting and for situations in which buildings would remain occupied but tenants would be required to vacate their units temporarily to allow for construction activity.

The estimates of total costs per square foot for the Alternatives are presented in Table 14. Unlike the base costs which are expressed by a single number for each prototype, the estimates of total costs result in a range of costs for buildings of a particular prototype. The range of costs for prototypes reflects the different characteristics of individual buildings that determine whether the different components of cost apply (for example, whether cost premiums for historic buildings and/or residential relocation costs apply), as well as the magnitude of costs for the various components (such as lost revenue due to retrofitting which varies according to the use of buildings and location). Weighted average costs per square foot for space in buildings of each prototype have been calculated to facilitate comparisons with the base costs per square foot in Table 12.

Generally, total costs per square foot are significantly higher than base costs per square foot. Weighted average total costs per square foot are from 1.2 to 2.1 times higher than base costs per square foot depending on the prototype and the alternative. The overall weighted averages by alternative for space in all UMBs indicate that, in the aggregate, total costs are 1.57 times higher than base costs for Alternative 1, 1.61 times higher for Alternative 2, and 1.73 times higher for Alternative 3. As a result of these relationships,

TABLE 14
SEISMIC RETROFITTING ALTERNATIVES: TOTAL COSTS PER SQUARE FOOT BY PROTOTYPE

Prototype	Alternative 1		Alternative 2		Alternative 3	
	Weighted Average /a/	Range	Weighted Average /a/	Range	Weighted Average /a/	Range
A - small, one story	$14.81	$13.11 - 17.50	$13.74	$11.96 - 16.26	$17.55	$15.74 - 20.18
B - large, one story	7.85	7.46 - 9.05	11.35	10.60 - 13.19	14.19	12.74 - 18.25
C - irregular, residential	8.38	7.72 - 8.89	14.02	12.64 - 17.03	26.13	20.96 - 33.33
D - irregular, non-residential	8.61	7.71 - 9.53	13.12	11.29 - 14.82	27.03	20.79 - 33.69
E - small, industrial	12.78	12.33 - 14.86	13.60	12.80 - 17.64	18.87	17.78 - 24.11
F - large, industrial	5.97	5.66 - 6.91	10.94	10.27 - 12.52	14.27	13.08 - 17.26
G - small, 2-3 story, office/commercial	19.27	16.67 - 20.79	19.26	16.24 - 21.39	25.61	21.92 - 28.26
H - large, 2-3 story, office/commercial	8.46	7.49 - 9.14	13.53	11.37 - 14.92	20.55	15.79 - 24.52
I - small, 4+ story, office/commercial	14.03	12.26 - 14.88	26.96	21.34 - 28.10	33.78	26.90 - 36.19
J - large, 4+ story, office/commercial	7.18	6.56 - 7.80	14.96	13.18 - 16.23	30.04	22.08 - 35.82
K - small, 2-3 story, residential	19.72	17.75 - 21.26	17.07	15.16 - 20.46	23.77	21.47 - 27.81
L - large, 2-3 story, residential	11.03	9.23 - 11.62	14.73	12.19 - 16.48	17.33	13.97 - 21.22
M - small, 4+ story, residential	10.89	9.98 - 11.23	26.52	24.06 - 28.47	26.46	24.54 - 29.69
N - large, 4+ story, residential	7.01	6.48 - 7.28	16.04	14.84 - 18.88	31.74	25.28 - 44.66
O - assembly	12.56	12.06 - 13.55	18.84	16.60 - 21.70	28.16	23.92 - 37.52
Overall (All UMBs)	**$ 9.02**	**$ 5.66 - 21.26**	**$15.11**	**$10.27 - 28.47**	**$24.05**	**$12.74 - 44.66**

NOTE: Total costs include the base costs in Table 12 plus other costs to building owners of satisfying the alternative seismic retrofitting requirements. Total costs include the following cost items as applicable, in addition to the base costs: cost premium for retrofitting with occupants in place; cost premium for historically or architecturally significant buildings; engineering and architectural design fees and plan checking and permit fees; lost revenue to owners during retrofitting and re-leasing; owner's project management and administration costs; and relocation costs to owners of residential UMBs covered by the Residential Rent Stabilization Ordinance. Appendix Table 1 provides background on the estimates for each of these components of cost.

/a/ Weighted average cost per square foot for space in buildings of each prototype.

Source: Recht Hausrath & Associates

the overall differences in costs among Alternatives are slightly larger for total costs than for base costs alone.*

The estimates of total costs summarized for UMBs by major land use category are presented in Table 15. Overall, total costs per square foot for residential UMBs are higher than total costs per square foot for commercial/industrial UMBs. The costs for institutional UMBs are relatively high and vary depending on the alternative. The differences in costs among uses reflect many factors. Generally, the groups of residential and institutional UMBs include more buildings of prototypes that have relatively higher costs per square foot while the commercial/industrial group includes proportionally more buildings of prototypes that have lower costs per square foot (such as the one-story and industrial building prototypes). Moreover, there is an additional component of cost for residential UMBs covered by the Residential Rent Stabilization Ordinance (relocation costs) that does not apply to commercial/industrial UMBs. Within the commercial/industrial category, the commercial and office UMBs have relatively higher costs per square foot on average than the industrial UMBs.

*There are three prototypes for which weighted average total costs per square foot are lower for Alternative 2 than for Alternative 1. This reflects the similarity of base costs under Alternatives 1 and 2 for those prototypes in combination with the assumption that buildings of those prototypes would be occupied during retrofitting under Alternative 1 and vacant during retrofitting under Alternative 2. Although the engineering assessment of disruption indicates that construction on those prototypes under Alternative 1 could be done without serious disruption to occupants, there appear to be cost incentives that could result in vacancies under this alternative as well.

TABLE 15

SEISMIC RETROFITTING ALTERNATIVES: SUMMARY OF TOTAL COSTS PER SQUARE FOOT BY MAJOR USE CATEGORY

Use /a/	Alternative 1		Alternative 2		Alternative 3	
	Weighted Average/b/	Range	Weighted Average /b/	Range	Weighted Average /b/	Range
All UMBs /c/	$9.02	$5.66 - 21.26	$15.11	$10.27 - 28.47	$24.05	$12.74 - 44.66
Commercial/Industrial UMBs	8.70	5.66 - 19.46	14.01	10.27 - 28.10	22.29	12.74 - 44.66
Residential UMBs	9.38	6.91 - 21.26	16.73	11.81 - 28.47	26.82	15.00 - 36.63
Institutional UMBs	10.33	6.36 - 14.74	15.50	11.40 - 19.07	22.98	13.97 - 27.92

NOTE: Total costs include the base costs in Table 12 plus other costs to building owners of satisfying the alternative seismic retrofitting requirements. Total costs include the following cost items as applicable, in addition to the base costs: cost premium for retrofitting with occupants in place; cost premium for historically or architecturally significant buildings; engineering and architectural design fees and plan checking and permit fees; lost revenue to owners during retrofitting and re-leasing; owner's project management and administration costs; and relocation costs to owners of residential UMBs covered by the Residential Rent Stabilization Ordinance.

/a/ The categorization of UMBs is according to the use of the space in the building.

/b/ Weighted average cost per square foot for space in buildings in each use category.

/c/ See Table 14.

SOURCE: Recht Hausrath & Associates

IV. SIGNIFICANCE OF RETROFITTING COSTS TO BUILDING OWNERS

This chapter evaluates the costs of the retrofitting alternatives from the perspective of building owners. "Owner-burden ratios" are calculated to identify how the retrofitting costs compare to building income assuming existing uses and rent levels and no economic assistance. The ratios provide a means for assessing impacts on building value and a measure of potential financial hardships for building owners. They also provide an indication of the potential responses of building owners to the retrofitting requirements as input into the identification of building outcomes (presented in Chapter V).

OWNER-BURDEN RATIOS

Owner-burden ratios are calculated on a building-by-building basis for all commercial/industrial and residential UMBs. The approach here is to consider the extent to which the costs of retrofitting would reduce net income from the building, income that otherwise would be available to repay outstanding loans (if any) and provide return on owners' equity. Existing building value (a function of the income that can be earned from the building) would be lowered to the extent that net income is reduced. In other words, the value of UMBs (under base case conditions without the retrofitting requirement and without an earthquake) would be lowered because of the costs required for retrofitting.

The owner-burden ratios identify the percentage of net building income that would be required to cover the costs of the retrofitting alternatives. The general formula for

the calculations is the following:

$$\text{Owner Burden Ratio} = \frac{\text{Annualized Cost of Retrofitting Assuming 12\% Interest Rate and 10-year Amortization Period}}{\text{Annual Net Income Assuming Current Uses and Rent Levels}}$$

The owner-burden ratio is designed to provide a relatively simple measure of economic hardship that can be calculated for all UMBs.* The costs of the retrofitting alternatives are total costs as described in the previous chapter of this report and summarized in Table 14. Net income is gross building receipts from rents (accounting for vacancy) minus operating expenses, insurance, and real estate taxes.** The calculations do not assume any economic assistance that could be available to assist and encourage owners to do the retrofitting (since it is the purpose of this analysis to determine impacts in the absence of economic assistance that could be considered as mitigation for hardships that are identified).

The owner-burden ratios assume current uses and rent levels. It is the premise of the analysis that building owners maximize income from their property. Except in the case of rent-controlled residential units, rents reflect what the market will bear for the particular use and location of the building. This means that the owner cannot expect to generate more rental income from the building solely as a result of

*Background on the calculations of owner-burden ratios is provided in Appendix 2.

**Assumptions about net income were developed by Recht Hausrath & Associates (RHA), specific to different land uses and locations. Rent, vacancy, and operating cost assumptions come from a variety of sources as described in Appendix 2.

completing the seismic retrofitting work.* In other words, the retrofitting work alone would not result in a direct pass-through of costs to building tenants, except under the pass-through provisions for capital improvements to residential UMBs subject to the Residential Rent Stabilization Ordinance (because rents for rent-controlled units would be below market levels). (The situation for rent-controlled UMBs is discussed at the end of this chapter.) Higher rental income would only result from a change in the use of the property or in the real estate sub-market it serves (through conversion, new construction, or upgrading). It also would result from situations in which the cumulative effect of the retrofitting requirement would be an overall reduction in supply of space available to a particular sub-market of demand such that rents for the remaining space of that type are bid up to a higher level. Later, in the assessment of building outcomes in Chapter V, consideration is given to the potentials for other uses and sub-markets and to the overall effects of retrofitting requirements on the supply of space and rents. The owner-burden ratios shown here, based on current uses and rent levels and only including rent increases as allowed by law for residential UMBs under the Residential Rent Stabilization Ordinance, provide input into that analysis.

The owner-burden ratios indicate lowered income, and thus lowered value (as represented by the capitalized income stream), under existing uses due to the retrofitting requirement. A reduction in value means that owners would lose some or all of their equity in the building, depending on the amount of equity and the cost of retrofitting. Owners' equity represents cash invested in the building as well as value gained through market appreciation over time. For buildings with existing debt, reductions in value could be larger than the amount of owners' equity such that the remaining value is less than the borrowed amount. In those situations, owners probably

*The analysis assumes that rents for space in UMBs are not discounted to reflect concerns about the safety of these buildings. Alternatively, it may be the case that rents do reflect such concerns. If so, owners could expect higher rents as a result of strengthening their buildings. Such higher rents would translate into lower owner-burden ratios than calculated in this study. Similarly, if vacancy rates in UMBs are higher because of concerns about safety, strengthening could result in lower vacancies, higher rental income, and, thus, lower owner-burden ratios.

would not have the incentive to repay existing debt and cover the costs of retrofitting. Such owners, who were required to do the retrofitting, would likely relinquish their interest in the building to the lender. (They also are likely to delay the retrofitting as long as possible.) In the event of foreclosure, lenders also would absorb losses equal to the amount by which the outstanding loan and the costs of retrofitting exceeds the value of the building after retrofitting.

The owner burden of the retrofitting requirement would fall on existing owners of UMBs (and, possibly, on lenders with existing loans on UMBs). It is the existing owner who must pay the costs of retrofitting or sell at a discounted value prior to retrofitting. Over the longer term, the cumulative effects of the retrofitting requirement could result in higher rents for space in particular real estate sub-markets such that owners eventually could recover some of the costs of retrofitting. The longer-term perspective is addressed in Chapter V, considering if such effects would occur and how existing or future owners might be affected.

POTENTIAL HARDSHIPS FOR OWNERS

The owner-burden ratios are summarized for all commercial/industrial and residential UMBs in Table 16. The key conclusions lie in the comparison of alternatives. The results for any one alternative provide an overview of how the costs of retrofitting would compare to building incomes under existing uses. The burdens could be overestimated for owners who have other options for their property (new construction, conversion to a different use, or upgrading to a different sub-market) and where effects of the requirements on the supply of space could result in higher rents (as addressed in the next chapter of this report).

The distribution of UMBs in terms of owner-burden ratios indicates that retrofitting costs would be significant to many owners. Under Alternative 1, ratios for most UMBs would be in the range of 11% to 40% and the mid-point (where half the

TABLE 16
SUMMARY OF OWNER-BURDEN RATIOS FOR SEISMIC RETROFITTING ALTERNATIVES, ASSUMING EXISTING USES AND RENT LEVELS AND NO ECONOMIC ASSISTANCE

Owner-Burden Ratios	Alternative 1			Alternative 2			Alternative 3		
	Number of UMBs	Percent of UMBs	Cumulative Percent	Number of UMBs	Percent of UMBs	Cumulative Percent	Number of UMBs	Percent of UMBs	Cumulative Percent
0 - 10%	83	4%	4%	28	1%	1%	15	1%	1%
11 - 20%	712	37%	41%	125	6%	7%	32	2%	3%
21 - 30%	552	28%	69%	438	22%	29%	101	5%	8%
31 - 40%	340	18%	87%	733	38%	67%	339	17%	25%
41 - 50%	161	8%	95%	342	18%	85%	457	24%	49%
51 - 60%	69	4%	99%	150	8%	93%	416	21%	70%
61 - 70%	27	1%	99+%	64	3%	96%	197	10%	80%
71 - 80%	5	sm	99+%	36	2%	98%	179	9%	89%
81 - 90%	1	sm	99+%	30	2%	99+%	92	5%	94%
91 - 100%	4	sm	99+%	5	sm	99+%	45	2%	96%
> 100%	2	sm	100%	5	sm	100%	83	4%	100%
TOTAL /a/	1,956	100%		1,956	100%		1,956	100%	

NOTE: Owner-burden ratios identify the percentage of net building income that would be required to cover the costs of the retrofitting alternatives. Costs are total costs as summarized in Table 14 and associated text, annualized assuming 12% interest and 10-year amortization. Net income is gross building receipts minus operating expenses, insurance, and real estate taxes. The owner-burden ratios assume current uses and rent levels except for increased rents allowed under the pass-through provisions for capital improvements for residential UMBs subject to the Residential Rent Stabilization Ordinance. No economic assistance is assumed. The key conclusions from the Table lie in the comparison of alternatives. The burdens could be overestimated where there are other options for the property and where effects of the requirements on the supply of space could result in higher rents.

/a/ There are 1,959 commercial/industrial and residential UMBs. Owner-burden ratios were not calculated for three UMBs because of missing data.

SOURCE: Recht Hausrath & Associates

buildings are above and half below) would fall in the range of 21% to 30%. Given these ratios, the burden on most owners of UMBs under Alternative 1 would be in the form of lost equity (See Table 17). There also would be some situations where building values would be reduced below the level of outstanding mortgage amounts such that owners would relinquish their interest in the building to the lender and the lender would absorb a portion of the retrofitting cost.

The owner-burden ratios would be higher under Alternative 2 than under Alternative 1. Ratios for most UMBs would be in the range of 21% to 50% and the mid-point would fall in the 31% to 40% category (see Table 16). The burden on most owners of UMBs under Alternative 2 would be in the form of lost equity. Compared to Alternative 1, the amounts of loss would be larger. There also would be more situations where owners with outstanding debt on their buildings relinquish interest in the building to lenders who would absorb some of the retrofitting cost (see Table 17).

Hardships for owners would be significantly greater under Alternative 3 than under the other Alternatives. Under existing uses, the owner-burden ratios for most UMBs would be in the range of 31% to 80% (see Table 16). About half the UMBs would have ratios above 50%. As a result, equity owners of UMBs would lose a substantial portion of their equity, if not all of it. Many of those with existing outstanding debt on their buildings would relinquish interest in the building to lenders who would absorb significant amounts of the cost (see Table 17).

The significance of the hardships described above would depend on the individual circumstances of building owners. Owners include individuals, business entities, and non-profit groups. There are owners with large investments in UMBs and others with relatively small investments (including those owning a partial interest in a building). There are owners with many other investments besides that in the UMB and owners to whom the UMB represents all or a major share of their investments. The extent

TABLE 17
SEISMIC RETROFITTING ALTERNATIVES: SUMMARY OF POTENTIAL HARDSHIPS TO OWNERS AND LENDERS

Nature of Hardships	Percentage Distribution of UMBs by Alternative		
	Alternative 1	Alternative 2	Alternative 3
SOME HARDSHIP: Costs of retrofitting primarily represent loss of owners' equity (some or all equity depending on circumstances) with limited hardship on lenders.	87%	67%	25%
GREATER HARDSHIP: Costs of retrofitting represent loss of owners' equity, and, for buildings with large outstanding debt, lenders begin to absorb significant portions of cost.	12%	26%	45%
GREATEST HARDSHIP: Costs of retrofitting represent substantial losses for equity owners, and, for buildings with outstanding debt, lenders absorb significant amounts of cost.	1%	7%	30%

NOTE: This table summarizes the owner-burden ratios in Table 16 from the perspective of the potential hardships for existing owners of UMBs and for lenders. The importance is in the comparison of alternatives. The categorizations used to describe hardships are generalized. Hardship in any specific case would depend on the particular characteristics of the owner(s) and of the investment in the UMB. For the generalized categorizations here, "some hardship" includes situations with owner-burden ratios of 40% or less, "greater hardships" includes those with ratios of 41% to 60%, and "greatest hardship" includes UMBs with ratios over 60%.

SOURCE: Recht Hausrath & Associates

of current outstanding debt on the property also varies substantially among UMBs. There are situations where the UMB is owned free and clear of debt as well as those with varying amounts of outstanding debt. For these latter UMBs, the share of net income devoted to debt service varies depending on when the building was purchased or refinanced, the amount financed, and the interest rate. Information is not available to identify the particular characteristics and circumstances of owners of UMBs in San Francisco.

Hardships are likely to be most significant to owners who depend on income from the UMB for living expenses, and owners to whom the UMB represents all or a major share of their investments (including those who may be counting on equity from the UMB for retirement). The significance of hardships would be less to owners with diversified investments for whom the UMB represents a relatively small share of the total. Some of these owners may be able to use losses from their UMB to offset passive income from other investments, thereby reducing overall tax liabilities. There are situations where owners also are tenants of UMBs (such as for some industrial concerns in UMBs and for garages). Those owners would have to contend with both investment hardships as well as disruptions/costs to business operations.

The extent and degree of potential hardships for UMB owners described above provides an indication of the likelihood that owners would **protest** over the adoption of specific retrofitting requirements. It also provides an indication of the degree and ease of **compliance.** With reference to the categorizations in Table 17, owners facing "greater" and "greatest" hardships as well as lenders for those UMBs would be the most likely to object to the requirements. As shown, the number of owners potentially in those categories would increase substantially as the requirements increase (13% of owners under Alternative 1, 33% of owners under Alternative 2, and 75% of owners under Alternative 3). Similarly, owners in those groups would be the most likely to balk at compliance. Many of those in the category of "greater hardship" would be expected to delay the retrofitting work as long as possible. In addition to

delays, many of those in the category of "greatest hardship" would find it infeasible to ever do the retrofitting work. This latter group includes situations where UMBs ultimately would be demolished (as discussed in terms of building outcomes in Chapter V). Review of the extent of UMBs in these categories (where "greater" and "greatest" hardships are indicated) identifies significant differences in compliance among the Alternatives. Compliance would be highest in Alternative 1 and lowest in Alternative 3. Alternative 2 would fall in between.

VARIATIONS IN OWNER-BURDEN RATIOS AND IN POTENTIAL HARDSHIPS FOR OWNERS

Comparison of Commercial/Industrial and Residential UMBs

Owner-burden ratios have been separately summarized for commercial/industrial and residential UMBs in Table 18. The ratios for residential UMBs are higher than those for commercial/industrial UMBs. The ratios for residential UMBs are higher because, on average, the costs are higher (see Table 15) and incomes are lower, even after accounting for rent increases as allowed by law for residential UMBs covered by the Residential Rent Stabilization Ordinance (about 80% of all residential UMBs).

The differences in owner burdens between residential and commercial/industrial UMBs increase as the retrofitting requirements increase. Thus, in the aggregate, the choice of a seismic retrofitting alternative would make more difference to the financial situation of owners of residential UMBs than to owners of commercial/industrial UMBs. There are two main reasons. One is that, in the aggregate, there would be larger differences in retrofitting costs among alternatives (at least partly reflecting the increasing importance of residential relocation costs as construction requirements increase) (see Table 15). The other reason is that the percentage of retrofitting costs covered by rent increases allowed for capital improvements under the Residential Rent Stabilization Ordinance would decline as the requirements and costs of retrofitting

TABLE 18
OWNER-BURDEN RATIOS FOR COMMERCIAL/INDUSTRIAL AND RESIDENTIAL UMBs, ASSUMING EXISTING USES AND RENT LEVELS AND NO ECONOMIC ASSISTANCE

Owner-Burden Ratios	Percentage Distribution of UMBs by Alternative					
	Alternative 1		Alternative 2		Alternative 3	
	Commercial/ Industrial UMBs	Residential UMBs	Commercial/ Industrial UMBs	Residential UMBs	Commercial/ Industrial UMBs	Residential UMBs
0 - 10%	6%	1%	2%	small	1%	-
11 - 20%	32%	43%	8%	4%	2%	1%
21 - 30%	28%	29%	24%	20%	7%	2%
31 - 40%	22%	10%	39%	36%	22%	10%
41 - 50%	7%	11%	18%	17%	26%	19%
51 - 60%	4%	2%	6%	10%	22%	21%
61 - 70%	1%	3%	3%	4%	8%	13%
71 - 80%	-	1%	small	4%	6%	15%
81 - 90%	-	small	small	4%	4%	6%
91 - 100%	-	small	small	small	1%	4%
> 100%	-	small	-	1%	1%	9%
TOTAL	100%	100%	100%	100%	100%	100%
Number of UMBs	1,171	785/a/	1,171	785/a/	1,171	785/a/

NOTE: Owner-burden ratios identify the percentage of net building income that would be required to cover the costs of the retrofitting alternatives. Costs are total costs as summarized in Table 14 and associated text, annualized assuming 12% interest and 10-year amortization. Net income is gross building receipts minus operating expenses, insurance, and real estate taxes. The owner-burden ratios assume current uses and rent levels except for increased rents allowed under the pass-through provisions for capital improvements for residential UMBs subject to the Residential Rent Stabilization Ordinance. No economic assistance is assumed. The key conclusions from the Table lie in the comparison of alternatives. The burdens could be overestimated where there are other options for the property and where effects of the requirements on the supply of space could result in higher rents.

/a/ There are 788 residential UMBs. Owner-burden ratios were not calculated for three residential UMBs because of missing data.

SOURCE: Recht Hausrath & Associates

increase. (The situation for rent-controlled UMBs is discussed in more detail at the end of this chapter.)

The types of hardships described above for each of the alternatives would apply to proportionally more owners of residential UMBs and to proportionally fewer owners of commercial/industrial UMBs. Table 19 provides a summary of potential hardships similar to that in Table 17 (for all owners of UMBs) but separately identifying the percentages of owners of residential and commercial/industrial UMBs in each hardship group. This presentation highlights the conclusions just described.

More disaggregated tabulations of owner-burden ratios indicate differences among UMBs according to the type of commercial/industrial or residential use and according to location within San Francisco. However, these differences are not as significant as those shown when all commercial/industrial UMBs are compared to all residential UMBs. Further, the differences are not always generalizable because of the number of factors involved. For the owner-burden ratios (comparing costs to income), the costs are dependent largely on building prototype and alternative while income depends largely on building use and location. Thus, the ratios that result from any one perspective (use, location, or prototype) reflect a composite of all of those factors.

Recognizing the complexities, there are some generalizations that can be made. Background tables for the following discussion are provided in Appendix 2 (see Appendix Tables 2 through 6).

Differences Among Commercial/Industrial UMBs

Among commercial/industrial UMBs, owner-burden ratios would be **lower** than average for commercial UMBs in good retail locations and for commercial and office UMBs in good office locations. By location, UMBs in the Union Square area would have the lowest owner-burden ratios under all three Alternatives. Other commercial and office

TABLE 19
SEISMIC RETROFITTING ALTERNATIVES: POTENTIAL HARDSHIPS TO OWNERS AND TO LENDERS OF COMMERCIAL/INDUSTRIAL AND RESIDENTIAL UMBs

Nature of Hardships	Percentage Distribution of UMBs By Alternative					
	Alternative 1		Alternative 2		Alternative 3	
	Commercial/ Industrial UMBs	Residential UMBs	Commercial/ Industrial UMBs	Residential UMBs	Commercial/ Industrial UMBs	Residential UMBs
SOME HARDSHIP: Costs of retrofitting primarily represent loss of owners' equity (some or all equity depending on circumstances) with limited hardship on lenders.	88%	83%	73%	60%	32%	13%
GREATER HARDSHIP: Costs of retrofitting represent loss of owners' equity, and, for buildings with large outstanding debt, lenders begin to absorb significant portions of cost.	12%	13%	24%	27%	48%	40%
GREATEST HARDSHIP: Costs of retrofitting represent substantial losses for equity owners, and, for buildings with outstanding debt, lenders absorb significant amounts of cost.	small	4%	3%	13%	20%	47%

NOTE: This table summarizes the owner-burden ratios in Table 18 from the perspective of the potential hardships for existing owners of UMBs and for lenders. The importance is in the comparison of alternatives. The categorizations used to describe hardships are generalized. Hardship in any specific case would depend on the particular characteristics of the owner(s) and of the investment in the UMB. For the generalized categorizations here, "some hardship" includes situations with owner-burden ratios of 40% or less, "greater hardships" includes those with ratios of 41% to 60%, and "greatest hardship" includes UMBs with ratios over 60%.

SOURCE: Recht Hausrath & Associates

areas with relatively low ratios would include Polk Street, the Neighborhood Commercial Districts (NCDs), C-3-O North, Northeast Waterfront (Broadway and Jackson Square), Rincon Hill and the SSO/SPD portions of South of Market, and Civic Center.

Among commercial/industrial UMBs, owner-burden ratios would be **higher** than average for three types of UMBs: theaters and clubs (low rents and costly building prototypes for retrofitting); industrial UMBs with older, outmoded facilities (low rents and UMBs underutilized and sometimes vacant); and larger commercial and office UMBs in weak market locations (low rents, high vacancies, and many with costly building prototypes for retrofitting). Locations with relatively high owner-burden ratios would include Mid-Market, North of Market/South of California, South of Market areas with SLR and RSD zoning, industrial areas of the Mission, Potrero and South Bayshore districts, and UMBs in locations with NC-3 zoning.

Other commercial/industrial UMBs besides those of the types and in the locations specifically mentioned above generally would have owner-burden ratios that are more similar to the overall pattern for all commercial/industrial UMBs.

Differences Among Residential UMBs

It is more difficult to generalize about owner-burden ratios for residential UMBs. As with commercial/industrial UMBs, the ratios reflect the alternative, the building prototype, the use(s), and the location. In addition, there are three other factors that affect the relationships among types of housing and locations, often narrowing the differences in rents and owner-burden ratios. One is that rents, often described on a per-unit basis, figure into the calculations on a per-square-foot basis. As a result, lower rents for smaller housing units (such as residential hotel rooms) are relatively higher on a per-square-foot basis, while higher rents for larger units (such as one- and two-bedroom apartments) are relatively lower. Secondly, the "occupied" rents used in

the calculations for units covered by the Residential Rent Stabilization Ordinance are lower than market rents for vacant units, and the difference varies by area as a function of turnover. Generally, the lower rent uses and areas have higher turnover resulting in less difference between occupied and market rents in those areas than in higher rent areas where turnover is lower. Thirdly, many of the residential UMBs have a mix of uses (residential and commercial, tourist and residential hotel, apartments and residential hotel units, etc.) so that generalizations about the income-generating characteristics of different uses do not necessarily apply to buildings. For example, buildings with lower-rent residential units may not have high owner-burden ratios if commercial uses on lower floors provide substantial revenue (as is the case in parts of Chinatown).

Recognizing the above, there are generalizations among residential UMBs that would apply under Alternatives 2 and 3 (the differences under Alternative 1 are discussed below). Owner-burden ratios would tend to be **lower** than average for dwellings and flats and for UMBs with both residential and tourist hotel units. The former include many units in desirable neighborhoods and many single family homes and flats in smaller buildings that are not covered by the Residential Rent Stabilization Ordinance. The latter do relatively well because of the presence of tourist units that, in most cases, generate higher revenues than residential hotel units or apartment units. Owner-burden ratios would be generally **higher** than average for many of the residential hotel and apartment buildings (the exceptions being apartment buildings with substantial revenue from commercial uses on lower floors). Most of the units in those buildings have relatively lower residential rents (most are covered by the Residential Rent Stabilization Ordinance), many are building prototypes that would be relatively costly to retrofit, and the characteristics of construction and duration of retrofitting for many would require relocation payments to tenants, adding to the costs for owners.

The situation would be different under Alternative 1, however. In that case, rent increases allowed for retrofitting improvements under the Residential Rent Stabilization

Ordinance would have more effect on owner-burden ratios because such rent increases would be larger relative to retrofitting costs than under Alternatives 2 and 3 (see further explanation in the next section of this chapter). As a result, owner-burden ratios would be **lower** than average for apartment buildings under Alternative 1 (since most would collect higher rents to offset a portion of retrofitting costs) and **higher** than average for dwellings and flats (that would not collect higher rents because they are not covered by residential rent control). Owner-burden ratios for mixed residential and tourist hotels would be lower than average under Alternative 1 as in Alternatives 2 and 3. Owner burden ratios for residential hotels would be about average under Alternative 1 (higher rents would offset some retrofitting costs although the higher rents would not be as significant as for apartment buildings).

RENT INCREASES ALLOWED FOR RETROFITTING IMPROVEMENTS UNDER RESIDENTIAL RENT STABILIZATION ORDINANCE

Most residential UMBs are covered under San Francisco's Residential Rent Stabilization Ordinance. For this analysis, it is assumed that UMBs with five or more residential units are covered (representing 80% of residential UMBs). The owner-burden ratios for those buildings reflect provisions of the Ordinance and the Rent Board Rules and Regulations as they would affect building income and the costs of retrofitting. First, as mentioned above, the owner-burden ratios are based on occupied rents instead of market rents since increases in rents are limited under the Rent Board Rules and Regulations except as units are vacated. Second, the costs of retrofitting include required relocation payments (as described in Chapter III). Third, the calculations include "pass-through" income to owners as allowed under the rules and regulations for rent increases to pass through the costs of capital improvements such as retrofitting. Pass-through income is the additional rental income that residential building owners would receive if they retrofit their buildings.

Estimates of the pass-through income to owners assume the following:

- that the costs of retrofitting for purposes of the pass-through include only those items allowable under the rules (of the total costs identified earlier, interest costs above 10%, lost revenue, and relocation costs are excluded), and that allowable costs are apportioned among uses in the UMB based on square footage so that residential tenants pay only their share of costs;

- that annual increases in rents to pass through retrofitting costs are limited each year to 10% of the tenant's base rent (rent excluding any pass-through amounts) and that those annual increases for retrofitting accumulate over the years until the total amount of additional rent for retrofitting in any year equals the annual amortized cost of retrofitting (assuming 10% interest and 10-year amortization) or until the total amount of rent paid in any year (base rent plus pass-through amount) reaches the market rent level;

- that the increase in rents to pass through retrofitting costs applies only to existing tenants as long as they remain in the building or until the costs are covered;

- that existing tenants in UMBs remain or, if relocated, return after completion of retrofitting; and

- that there is normal turnover of existing tenants over time (for reasons other than retrofitting) that reduces the total amount of pass-through income to owners (existing tenants are assumed to be gone in 10 years of the retrofitting and 10% are assumed to leave each year*).

The owner-burden ratios include pass-through income. Table 20 shows pass-through income as a percentage of total costs for retrofitting alternatives (as defined earlier in Table 14 and associated text). Under Alternative 1, pass-through income would cover up to about 50% of costs, with most situations covering 21% to 50% of costs. Under Alternative 2, pass-through income would represent a smaller share of costs, covering 11% to 40% of costs in most cases. Pass-through income would represent

*Pass-through income depends on assumptions about tenant turnover. This analysis makes simplifying assumptions. The specifics of particular situations could vary substantially. Pass-through income would be larger than estimated if existing tenants stay longer than assumed. However, pass-through income would be lower than estimated if not all existing tenants stayed after retrofitting or returned in the case of relocations.

TABLE 20

PASS-THROUGH INCOME FOR RESIDENTIAL UMBs COVERED UNDER RESIDENTIAL RENT STABILIZATION ORDINANCE AS A PERCENTAGE OF TOTAL COSTS FOR RETROFITTING ALTERNATIVES

Pass-Through Income as Percent of Total Costs	Alternative 1		Alternative 2		Alternative 3	
	Number of UMBs	Percent	Number of UMBs	Percent	Number of UMBs	Percent
0 - 10%	12	2%	27	4%	66	10%
11 - 20%	74	12%	143	23%	259	41%
21 - 30%	138	22%	228	36%	236	38%
31 - 40%	187	30%	228	36%	67	11%
41 - 50%	217	34%	2	small	-	-
TOTAL	628	100%	628	100%	628	100%

NOTE: The 628 UMBs included in this table are those with five or more residential units. It is assumed that these UMBs are covered by the Residential Rent Stabilization Ordinance. The text provides background on the estimates of pass-through income. The estimates do not account for the possibility that there would be exemptions from rent increases for retrofitting on the basis of hardship.

SOURCE: Recht Hausrath & Associates

the smallest share of costs under Alternative 3, covering 11% to 30% of costs in most cases.

The information in Table 20 shows that pass-through income would not be large enough to cover the total costs of retrofitting under any of the alternatives. There are several reasons. One relates to the turnover of existing tenants over time. When existing tenants leave before they have paid their unit's share of retrofitting costs, there is no further pass-through income to owners from the vacated units.* The assumptions made about turnover for this analysis are that most tenants would leave their units before the end of the ten years for amortizing retrofitting costs. Another reason relates to the finding that, although there would be numerous situations where the total increase in rent for retrofitting eventually would equal the annual amortized cost of retrofitting, it would take several years in most cases before that level is reached because of limits on annual increases in rents to pass through retrofitting costs (limited each year to 10% of base rent excluding any pass-through amounts). Although the total duration of time that the tenant pays higher rent for retrofitting can be extended until costs are recovered, tenants generally do not stay in the same unit long enough to make up for the differential between costs and pass-through rent increases in the early years. A third reason relates to the fact that market rents provide an upper limit on the total amount of pass-through rent increases (since the total amount of rent including base rent and the pass-through amount cannot exceed

*When there is turnover, the unit is rented to a new tenant at market rent. The fact that the owner may be better off because market rent may be higher than the occupied rent plus pass-through (higher at least for some time into the future) is not relevant from the perspective of the burden on owners due to retrofitting requirements. The pass-through from existing tenants is income that the owner would not collect if there were no retrofitting requirement. However, the ongoing turnover of tenants also would occur in the base case without retrofitting. Thus, compared to the base case, pass-through income would add revenue for owners and would reduce the impact of retrofitting requirements. Turnover would not change the effects of retrofitting as long as it occurs at a rate similar to that expected in the base case and reflected in the occupied rents assumed in the owner-burden calculations. If, instead, the rate of turnover increased as a result of the requirements, occupied rents would be higher than assumed herein. However, pass-through income would be lower.

market rent*). In many situations, total rents including pass-through amounts for tenants who remained in their retrofitted units would reach market levels at a place where the pass-through amount would be less than the annual amortized cost of retrofitting. Thus, in those situations, pass-through income would be less than total cost. A **fourth** reason is that many of the residential UMBs include other uses besides residential units covered under the Residential Rent Stabilization Ordinance (such as commercial uses and tourist hotel units). Because total retrofitting costs include costs for non-residential portions of buildings that do not provide any pass-through income and because costs are apportioned among uses for purposes of pass-through, pass-through income would be less than total costs for those residential UMBs with other uses. A **fifth** reason is that total retrofitting costs include some items that are not allowable under the rules governing rent increases to pass through the costs of capital improvements.

The percentages expressing pass-through income as a share of total retrofitting costs in Table 20 decline by alternative. This reflects the finding that as retrofitting requirements increase, retrofitting costs increase more than pass-through income.

*If market rent was exceeded, the existing tenant would move to another unit charging market rent and would be replaced by a new tenant paying market rent.

V. LAND USE AND SOCIOECONOMIC IMPACTS

Requirements to spend money to complete the seismic retrofitting of a UMB would influence building owner decisions about the longer-term use of their property. Depending on current building occupancies as well as alternative uses for the buildings and their sites, owners of UMBs would decide to either complete the retrofitting work, or undertake the retrofitting project while also converting the building to a higher-rent paying use, or demolish the building for new development, or demolish the building and hold or sell the land because compliance with retrofitting requirements would not be feasible. In some cases, the UMB would have been converted or demolished for new development in any case, as part of the on-going pattern of land use change in the City. Requirements to retrofit could change a building owner's calculation of what to do with the UMB and when to act.

Analysis of building outcomes was undertaken to determine what difference the alternatives would make for the stock of UMBs in San Francisco and for the availability of various types of space and, thus, for tenants' choices over the longer term. The analysis plays out the consequences of alternative requirements to spend money to retrofit UMBs, considering current building occupancies, zoning and development potential, and real estate market conditions and trends. Depending on the building owners' assessment of those factors, and the magnitude of the required retrofitting expenditure, the disposition of the unreinforced masonry building stock could be different in the future than it would if that expenditure were not required.

This chapter presents conclusions about how the alternative retrofitting requirements are likely to affect building outcomes. Those effects of the requirements are then evaluated from several perspectives: from a citywide perspective in terms of land use change and development patterns in areas of the City in which UMBs are concentrated; from the perspective of businesses in terms of the availability and cost of space of various types;

from the perspective of households and population in terms of the availability of housing and rents; from the perspective of building owners in terms of the longer-term incidence of retrofitting costs; and from the perspective of the City's fiscal situation in terms of potential effects on revenues from property taxes. Appendix 3 provides background on the methodology for the longer-term building outcome and impact analysis.

INTRODUCTION TO LONGER-TERM ANALYSIS

Time Horizons

There are two time horizons for the longer-term analysis of building outcomes and implications for occupants and land use. The first, designated the 1990-2000 period, is the enforcement period assumed for the purposes of this analysis, during which the retrofitting requirements would have to be undertaken. This is a simplifying assumption for analytical purposes; the seismic retrofitting program eventually proposed is likely to incorporate a range of timeliness for compliance. The second time horizon accounts for a longer-term outlook, through approximately the year 2020. While it is assumed that UMB owners would be required to complete seismic retrofitting within the 10 years from 1990 through 2000, a longer-term outlook is important because it establishes a base case against which to evaluate the implications of the alternatives for the timing of development.

Base Case Scenario

For this study, four scenarios of building outcomes are developed, one for each of the three retrofitting alternatives and one for a base case scenario of what otherwise would be expected to occur without new retrofitting requirements. The base case scenario is important, since, independent of new retrofitting requirements, UMBs can be expected to experience development and land use change over time, in response to changing economic, demographic, and real estate market factors. The effects of the retrofitting alternatives are identified by the **differences** in building outcomes between the scenarios developed for

each of the alternatives and the base case scenario of what otherwise would be expected to occur.

This study does not consider a future scenario with a major earthquake. That event in itself would have significant implications for the City's residents and businesses and for land use and development in the City. By essentially ignoring the probability of a major earthquake and its economic consequences, the analysis focuses on the consequences of the costs and implementation of seismic retrofitting requirements when compared to a relatively straightforward future scenario, i.e., without an earthquake, of development potential and land use trends. This approach is not intended to minimize the consequences of a major earthquake; the purpose of all of the UMB study efforts combined is to develop a program to reduce the potential casualties and economic losses from a major earthquake. The EIR, Earthquake Hazard Reduction in Unreinforced Masonry Buildings: Program Alternatives, and the Rutherford & Chekene report, Seismic Retrofitting Alternatives for San Francisco's Unreinforced Masonry Buildings: Estimates of Construction Costs and Seismic Damage, present some of the economic consequences of earthquake damage to UMBs.

Definitions of Building Outcomes

Five categories have been developed to describe building outcomes for the economic and land use impact assessment. They are:

- UMB demolished for new construction,
- UMB converted or altered, and retrofit to 104(f),
- UMB retrofit per alternative,
- UMB at risk, and
- UMB without retrofit.

Together, those categories cover the range of possible building outcomes quantified in this analysis of UMBs. The building outcome scenarios for the base case and for the three seismic retrofitting alternatives are summarized according to those categories. Other

changes to the supply of commercial/industrial space and housing also would occur, but are not quantified. The potential for upgrading and remodelling to attract higher-rent-paying tenants is discussed qualitatively for both commercial/industrial and residential UMBs.

Demolished for new construction represents situations in which the UMB would be likely to be demolished to make way for a new development project. In many of those cases, the parcel on which the UMB sits would be combined with adjacent parcels to create a larger development site.

The category **converted or altered, and retrofit to 104(f)** is for situations in which, according to current City policy, UMBs converted to other uses or substantially altered or enlarged would have to complete seismic retrofitting to the standards of Section 104(f) of the current building code. That is the same level of seismic upgrading that would be required of all UMBs under Alternative 3. Conversions of UMBs to attract higher-rent-paying uses and alterations to accommodate more revenue-generating space are expected to continue in the future. If either Alternative 1 or Alternative 2 were implemented as the general seismic retrofitting requirement, UMB conversions or substantial alterations would still trigger Section 104(f) requirements. Under Alternative 3, the category "converted or altered, and retrofit to 104(f)" refers to only those cases in which the UMB would be converted or substantially altered (with a penthouse addition, for example).

Retrofit per alternative means that the building owner would undertake the retrofitting project as required. No buildings would fall into this category in the base case scenario. In the Alternative 3 scenario, buildings in this category would be retrofit to the level of Section 104(f); they would not have undergone conversion or alteration. Those 104(f) cases are identified separately, as described above.

At risk means that the UMB would not be retrofit and would be at risk of eventual demolition as a result of the retrofitting requirements. "At risk" identifies situations in which the cost of retrofitting would exceed the value of the building. Consequently, there

would be no incentive for owners to do the retrofitting. Generally, UMBs at risk would be buildings for which retrofitting costs would be relatively high and rental income from existing uses relatively low. In addition, other options for owners of those buildings would be limited (at least for some time into the future). In many situations, market demand for upgraded, converted, or new space in the area would be lacking. There also could be other prohibitive costs associated with changing uses or with new development (such as the requirement to replace residential units demolished for new construction). Thus, it would make more economic sense for owners of UMBs at risk to demolish the building and hold or sell the land rather than to undertake the required retrofitting project. (Many owners with outstanding loans for UMBs at risk probably would relinquish their interest in the building to the lender; the same economic assessment, resulting in demolition of the building, would apply to lenders.) "At risk" does not apply in the base case scenario.

The extent and timing of demolition of UMBs at risk would depend on enforcement of the retrofitting requirements and on the availability of economic assistance. In the absence of economic assistance that encourages retrofitting, many owners of "at risk" buildings probably would not go ahead with demolition until forced by the City. In many cases, demolition would not occur until the City began proceedings against properties that were not in compliance with the retrofitting requirement. While many UMB owners would move ahead with demolition at that point, there would be some situations in which owners essentially would abandon UMBs, leaving demolition or retrofitting and recovery of costs to the public sector through liens attached to the property. In those situations the speculative value of the land could be less than the costs to demolish.

Without retrofit applies, by definition, in the base case scenario only. The category identifies buildings that would remain without retrofitting in the absence of retrofitting requirements. In the base case scenario, those are UMBs that are not either demolished for new construction, or preserved, converted, or altered and thus retrofitted according to Section 104(f).

Organization of Chapter

The following discussion begins with an overview of the results of the longer-term building outcome analysis. That summary presents the basic conclusions about impacts for the unreinforced masonry building stock, comparing the alternatives to each other and to the base case scenario. After the overview, the discussion turns to more detailed assessment of how and why the alternatives would make a difference in development patterns and the supply of commercial and industrial space and of housing. That assessment also presents conclusions for longer-term impacts for the occupants of UMBs: availability and cost of commercial/industrial space for businesses, and availability and cost of housing. The assessment concludes with comments about the longer-term incidence of retrofitting costs. The assessment of the alternatives is presented separately for commercial/industrial and for residential land uses. At the end of the chapter, a brief section discusses the potential fiscal implications of the retrofitting alternatives in terms of effects on revenues from property taxes.

SUMMARY COMPARISON OF ALTERNATIVES IN TERMS OF BUILDING OUTCOMES

Table 21 summarizes the results of the building outcome analysis for all commercial/industrial and residential UMBs. The table shows what would be likely to happen to unreinforced masonry buildings in San Francisco if the situation regarding seismic retrofitting continued as it is today, with no mandatory retrofitting requirements (the base case scenario), except in the case of conversions or substantial alterations (seismic retrofitting required per Section 104(f) of the building code). For conclusions about the different implications of each alternative, the table shows what would be likely to happen to UMBs if retrofitting were required. There are results for two time periods: the assumed enforcement period (1990 - 2000) and the longer-term outlook (to about the year 2020).

TABLE 21

BUILDING OUTCOMES FOR BASE CASE AND RETROFITTING ALTERNATIVES (NUMBERS OF COMMERCIAL/INDUSTRIAL AND RESIDENTIAL BUILDINGS)

Outcome	Base Case		Alternative 1		Alternative 2		Alternative 3	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
1990 - 2000								
UMB Demolished for New Construction	48	3%	61	3%	75	4%	93	5%
UMB Converted/Altered and Retrofit to 104(f) /a/	65	3%	86	4%	101	5%	136	7%
UMB Retrofit per Alternative	NA		1,762	90%	1,651	84%	1,333	68%
UMB at Risk /b/	NA		50	3%	132	7%	397	20%
UMB without Retrofit	1,846	94%	NA		NA		NA	
TOTAL	1,959	100%	1,959	100%	1,959	100%	1,959	100%
Longer Term Outlook: Totals in 2020								
UMB Demolished for New Construction	161	8%	162	8%	166	8%	178	9%
UMB Converted/Altered and Retrofit to 104(f) /a/	127	7%	127	7%	129	7%	164	9%
UMB Retrofit per Alternative	NA		1,628	83%	1,542	79%	1,240	63%
UMB at Risk /b/	NA		42	2%	122	6%	377	19%
UMB without Retrofit	1,671	85%	NA		NA		NA	
TOTAL	1,959	100%	1,959	100%	1,959	100%	1,959	100%

NA = Not Applicable

/a/ UMBs converted to another use and UMBs undergoing substantial alternation or addition. That type of work triggers seismic retrofitting requirements per Section 104(f) of the current San Francisco Building Code.

/b/ UMBs at risk eventually would be demolished. In the absence of economic assistance, they are unlikely to be retrofit, given the high costs of retrofitting relative to building value.

SOURCE: Recht Hausrath & Associates

In the base case scenario through the year 2000, relatively few UMBs would be retrofit (only about three percent of the total). Most of those are buildings that would be converted to higher-rent-paying uses, and therefore would be retrofit according to the requirements of Section 104(f) of the building code. In the expected course of development in San Francisco, a few UMBs would be demolished for new construction between 1990 and 2000. (Most of those buildings are part of downtown projects that already have been approved.) Without requirements to retrofit, almost all UMBs would remain without that kind of upgrading in the year 2000. Over the 20 years beyond 2000, more UMBs would be retrofit according to Section 104(f), in the base case scenario. Also, more UMBs would be demolished for new construction. Over the longer-term in the absence of retrofitting requirements, about 85% of UMBs would remain unreinforced, while reasonably expected new development projects and conversions to other uses would take care of about 15% of the buildings.

Building outcomes under Alternative 1 would not be very different from those expected under the base case scenario, except that seismic retrofitting would be required. The retrofitting requirement would encourage, earlier than otherwise, some new construction on UMB sites and conversion to other uses, although the long-term totals for UMBs demolished for new development and UMBs converted would be essentially no different from the base case. Almost all of the remaining UMBs would be retrofit by 2000; only a few would fall into the "at risk" category. In the longer term, some of those at risk in 2000 eventually would be converted or demolished for new construction. Thus, the Alternative 1 retrofitting requirements eventually would result in demolition of only about two percent of the UMBs. Also, some UMBs that would be retrofit before 2000 would subsequently be demolished for new construction or converted, per the base case scenario. Ultimately, almost all of the UMBs that would remain "without retrofit" in the base case would be retained and retrofit under Alternative 1.

Alternative 2 would result in somewhat more variation from the base case scenario. There would be more UMBs demolished for new construction or converted to other uses sooner--

50% more UMBs demolished for new construction or converted, as opposed to being retrofit to the level required by the alternative between 1990 and 2000. The Alternative 2 requirements would result in a few more cases of UMBs demolished for new construction or converted to other uses over the longer term. About 7% of the UMBs would be at risk of eventual demolition with the retrofitting requirements of Alternative 2. More UMBs would be at risk under Alternative 2 than under Alternative 1, but the differences between those two Alternatives are not as dramatic as the comparison to building outcomes under Alternative 3. Ultimately, about 1,540 or 79% of the original stock of UMBs would be retrofit under Alternative 2. The rest would remain at risk (6%), demolished for new construction (8%), or converted/altered (7%).

Alternative 3 would result in significant differences in the timing of both demolition for new construction and conversion of UMBs to other uses, as well as in the total amount of such activity affecting that part of San Francisco's building stock. There would be almost twice as much demolition for new construction between 1990 and 2000 as there would be in the base case. There would be more than twice as much conversion and alteration triggering Section 104(f) seismic upgrading standards since that level of retrofitting would be required in any case. About 20% of the UMBs would be at risk of eventual demolition as a result of Alternative 3 retrofitting requirements. About two-thirds of the buildings would be retrofit in response to the requirements by the year 2000. Some of the UMBs at risk in the earlier period would be taken care of by development expected in the longer term. Although there would be some more demolition for new construction under Alternative 3 compared to the base case scenario, that outcome would be limited overall by demand for new development. Ninety percent of the UMBs demolished for new construction by 2020 under Alternative 3 also would be expected to be demolished for new construction in the base case. Over the long term, about 1,240 or 63% of the original unreinforced masonry building stock would be retrofit that would not be under the base case scenario. The rest would remain at risk (19%), demolished for new construction (9%), or converted/altered (9%).

COMPARISON OF BUILDING OUTCOMES FOR COMMERCIAL/INDUSTRIAL AND RESIDENTIAL UMBS

Results for Commercial/Industrial UMBs

The basic conclusions for all UMBs about the differences among alternatives in terms of building outcomes apply for commercial/industrial UMBs as well. Table 22 presents the summary results of the building outcome analysis for commercial/industrial UMBs.

For commercial/industrial UMBs, the differences between Alternatives 1 and 2 are not that great. Both would result in retrofitting of almost all UMBs that would remain unreinforced in the base case scenario. There would be about the same amount of conversion to other uses and demolition for new construction as there would be in the base case, although some of that would happen earlier than otherwise would be expected, as a consequence of the requirement to retrofit. By contrast, Alternative 3 would result in fewer commercial/industrial UMBs retrofit according to the requirements of the alternative and more UMBs at risk. Compared to the longer-term scenarios for either Alternative 1 or Alternative 2, there would be more UMBs demolished for new construction or converted to other uses under Alternative 3. Alternative 3 also would have a more substantial impact on the timing of demolition for new construction and conversion to other uses than would Alternatives 1 and 2.

Results for Residential UMBs

Table 23 presents the results of the building outcome analysis for residential UMBs. The comparison of building outcomes among alternatives is somewhat different for residential UMBs. (Because commercial/industrial buildings are about 60% of the total, the results for that group dominate the results for all UMBs.)

As for commercial/industrial UMBs, results under Alternative 1 for residential UMBs would be close to the base case scenario. By contrast to the results for commercial/industrial

TABLE 22

COMMERCIAL/INDUSTRIAL BUILDING OUTCOMES FOR BASE CASE AND RETROFITTING ALTERNATIVES (NUMBER OF UMBs)

Outcome	Base Case		Alternative 1		Alternative 2		Alternative 3	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
1990 - 2000								
UMB Demolished for New Construction	40	4%	47	4%	55	5%	66	6%
UMB Converted/Altered and Retrofit to 104(f) /a/	61	5%	81	7%	92	8%	118	10%
UMB Retrofit per Alternative	NA		1,001	85%	961	82%	818	70%
UMB at Risk /b/	NA		42	4%	63	5%	169	14%
UMB without Retrofit	1,070	91%	NA		NA		NA	
TOTAL	1,171	100%	1,171	100%	1,171	100%	1,171	100%
Longer Term Outlook: Totals in 2020								
UMB Demolished for New Construction	138	12%	139	12%	140	12%	145	12%
UMB Converted/Altered and Retrofit to 104(f) /a/	119	10%	119	10%	120	10%	146	13%
UMB Retrofit per Alternative	NA		879	75%	856	73%	726	62%
UMB at Risk /b/	NA		34	3%	55	5%	154	13%
UMB without Retrofit	914	78%	NA		NA		NA	
TOTAL	1,171	100%	1,171	100%	1,171	100%	1,171	100%

NA = Not Applicable

/a/ UMBs converted to another use and UMBs undergoing substantial alternation or addition. That type of work triggers seismic retrofitting requirements per Section 104(f) of the current San Francisco Building Code.

/b/ UMBs at risk eventually would be demolished. In the absence of economic assistance, they are unlikely to be retrofit, given the high costs of retrofitting relative to building value.

SOURCE: Recht Hausrath & Associates

TABLE 23

RESIDENTIAL BUILDING OUTCOMES FOR BASE CASE AND RETROFITTING ALTERNATIVES (NUMBER OF UMBs)

Outcome	Base Case		Alternative 1		Alternative 2		Alternative 3	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
1990 - 2000								
UMB Demolished for New Construction	8	1%	14	2%	20	3%	27	4%
UMB Converted/Altered and Retrofit to 104(f) /a/	4	1%	5	1%	9	1%	18	2%
UMB Retrofit per Alternative	NA		761	96%	690	87%	515	65%
UMB at Risk /b/	NA		8	1%	69	9%	228	29%
UMB without Retrofit	776	98%	NA		NA		NA	
TOTAL	788	100%	788	100%	788	100%	788	100%
Longer Term Outlook: Totals in 2020								
UMB Demolished for New Construction	23	3%	23	3%	26	3%	33	4%
UMB Converted/Altered and Retrofit to 104(f) /a/	8	1%	8	1%	9	1%	18	2%
UMB Retrofit per Alternative	NA		749	95%	686	87%	514	65%
UMB at Risk /b/	NA		8	1%	67	9%	223	29%
UMB without Retrofit	757	96%	NA		NA		NA	
TOTAL	788	100%	788	100%	788	100%	788	100%

NA = Not Applicable

/a/ UMBs converted to another use and UMBs undergoing substantial alternation or addition. That type of work triggers seismic retrofitting requirements per Section 104(f) of the current San Francisco Building Code.

/b/ UMBs at risk eventually would be demolished. In the absence of economic assistance, they are unlikely to be retrofit, given the high costs of retrofitting relative to building value.

SOURCE: Recht Hausrath & Associates

UMBs, however, there would be more difference between Alternative 2 and Alternative 1 for residential UMBs. The difference lies in the estimate of the number of UMBs that would be at risk of eventual demolition. While the Alternative 1 and 2 scenarios for demolition for new construction and conversion to other uses are very similar and are not that different from the base case, there would be proportionally more residential UMBs at risk under Alternative 2 (9% of residential UMBs under Alternative 2, compared to 1% percent of residential UMBs under Alternative 1).

As is the case for commercial/industrial UMBs under Alternative 3, the results for residential UMBs under Alternative 3 stand out by contrast to the results under Alternatives 1 and 2 (even though the latter two are more different from each other). About the same share of UMBs would be retrofit; again, the difference is in the share of UMBs in the "at risk" category: about 30% of all residential UMBs under Alternative 3. That result is also substantially larger than the conclusion for commercial/industrial UMBs. About 15% of all commercial/industrial UMBs would be at risk of eventual demolition under Alternative 3.

How the Two Compare

Under the base case scenario, commercial/industrial buildings represent most of the UMBs that would be demolished for new construction or converted to higher-rent-paying uses and therefore retrofit according to the requirements of Section 104(f). Very little new development or conversion is expected in the base case scenario for residential UMBs. Potentials for new development and land use change are substantially greater for commercial/industrial UMBs than for residential UMBs in terms of both real estate market factors and city zoning controls and policies. As a result of the differences in building outcomes under the base case over the longer-term, proportionally more of the residential UMBs would remain unreinforced (96% of residential UMBs compared to 78% of commercial/industrial UMBs), while reasonably expected new development projects and

conversions would take care of proportionally more commercial/industrial UMBs (22% of commercial/industrial UMBs compared to 4% of residential UMBs).

For commercial/industrial buildings, retrofitting requirements would have more impact on the timing of demolition for new construction and the timing of conversion or alteration than would be the case for residential UMBs. For residential UMBs, across all alternatives, there would not be that much difference from the base case scenario in terms of either demolition for new construction or conversion. Instead, the impacts of the retrofitting requirements for residential UMBs are evident in the "at risk" category.

There are several reasons behind the conclusions about the differences in impacts for commercial/industrial and residential UMBs. In the first place, the range of potential development options is greater for commercial/industrial buildings than it is for residential buildings. Not only does zoning in most downtown and other commercial districts allow substantially larger new buildings to be built on the sites of smaller, older buildings, but also, with the exception of designated buildings or buildings in designated historic districts, there are no additional policy constraints as there are on the demolition of housing units or additional costs (as there are with respect to the replacement of demolished or converted residential hotel units). Furthermore, in many areas, expected business growth over time will support demand for new and renovated space, making new development or conversion a feasible alternative to retrofitting. Finally, as described in the analysis of owner burden in Chapter IV, in general, commercial/industrial building values would provide more support for retrofitting costs than would residential building values. That is primarily because the income stream from commercial/industrial buildings generally is higher and the retrofitting costs per square foot for commercial/industrial buildings generally are lower. One factor contributing to the relatively lower building income for most residential buildings is the annual limitations on increases in rents for existing tenants as regulated by San Francisco's Residential Rent Stabilization Ordinance. Another distinguishing factor adding to the cost side for residential UMBs is the relocation payment to tenants temporarily displaced from the building as a consequence of retrofitting.

IMPLICATIONS OF COMMERCIAL/INDUSTRIAL BUILDING OUTCOMES

Implications for Development Patterns and Land Use Change

The second chapter of this report described commercial and industrial UMBs in terms of the land use characteristics and real estate market factors of the areas in which they are located. That discussion provides a context for the following conclusions about the impacts the retrofitting requirements would have on development patterns and land use change in those locations.

Because development potential and real estate market conditions vary by location, the impacts of the retrofitting requirements on land use change would vary by location. To illustrate those impacts, Table 24 summarizes the **differences** between the base case scenario and each alternative in the number of UMBs demolished for new construction or converted to another use during the 1990 - 2000 period. That measure of the differences indicates how much the retrofitting requirements would influence the pace of otherwise expected new development on UMB sites and conversion of UMBs to other uses.

The numbers in the table confirm preceding conclusions about the impact of alternatives on the timing of development: while all retrofitting requirements would result in some shifts in the timing of development involving commercial/industrial UMBs, the impacts would be substantially greater in Alternative 3. The differences among alternatives are not uniform by location. The percentages in the table are a good relative measure across locations of the degree to which the retrofitting requirements would speed demolition of commercial/industrial UMBs for new construction and conversion of UMBs to other uses. Other types of development--upgrading for higher-rent-paying tenants and additions to

TABLE 24

EFFECTS OF RETROFITTING ALTERNATIVES ON COMMERCIAL/INDUSTRIAL DEVELOPMENT AND CONVERSION: 1990 - 2000, BY LOCATION

Additional Commercial/Industrial UMBs Demolished or Converted as a Result of Retrofitting Alternatives

Location	Alternative 1	Alternative 2	Alternative 3
C-3-O North	2	5	5
C-3-O South	2	3	11
Union Square	1	3	3
Mid-Market/C-3-S	1	1	6
Civic Center	0	0	2
SOMA/Rincon Hill	7	7	33
Northeast Waterfront	0	0	5
Chinatown	2	2	2
Van Ness	0	0	3
Polk Street	0	0	0
NOMA/SOCAL	0	0	0
NCDs	0	0	1
Neighborhoods	3	5	6
NC-3	0	1	2
Mission Commercial	1	1	1
Industrial Areas	2	4	4
TOTAL	21	32	84

Percent of Commercial/Industrial UMBs in Each Location Demolished or Converted as a Result of Retrofitting Alternatives

	Total UMBs	%	%	%
C-3-O North	65	3.08	7.69	7.69
C-3-O South	104	1.92	2.88	10.58
Union Square	101	0.99	2.97	2.97
Mid-Market/C-3-S	83	1.20	1.20	7.23
Civic Center	51	0.00	0.00	3.92
SOMA/Rincon Hill	210	3.33	3.33	15.71
Northeast Waterfront	123	0.00	0.00	4.07
Chinatown	101	1.98	1.98	1.98
Van Ness	38	0.00	0.00	7.89
Polk Street	33	0.00	0.00	0.00
NOMA/SOCAL	61	0.00	0.00	0.00
NCDs	20	0.00	0.00	5.00
Neighborhoods	40	7.50	12.50	15.00
NC-3	33	0.00	3.03	6.06
Mission Commercial	54	1.85	1.85	1.85
Industrial Areas	54	3.70	7.41	7.41
TOTAL	1,171	1.79	2.73	7.17

NOTE: The differences represent the larger number of UMBs in the 1990-2000 period that would be demolished for new construction, or converted to another use, compared to the number of UMBs affected by development in the base case scenario.

SOURCE: Recht Hausrath & Associates

building space with no change in use--are not quantified in Table 24.* However, they are discussed in the sections that follow.

Areas Where Retrofitting Requirements Would Make the Most Difference in Development and Land Use Change

The retrofitting requirements would make the most difference in the timing of development and land use change in the South of Market area, in the C-3-O districts South and North of Market Street, in industrial areas in the southeastern parts of the City, and in the neighborhoods.

There are expected to be some cases in which the retrofitting requirements of Alternatives 2 or 3 would affect the timing of new development projects. In general, the investment in retrofitting a UMB is small relative to the other cost and revenue factors influencing decisions on larger downtown development projects. As a result, retrofitting requirements alone would not be the sole reason for a new development project. Nevertheless, there are expected to be development situations in the C-3-O North and South, particularly cases of more than one UMB on the development site, in which property owners would be likely to move more quickly with development plans rather than retrofit buildings that would later be demolished for new construction. In the C-3-O North, such developers would be in strong market positions, so the risks of moving ahead with new development would be relatively low. In the C-3-O South, most of the potential sites for new development now contain unreinforced masonry buildings. Under the Downtown Plan, those blocks south of Market Street and east of Yerba Buena Gardens are intended to accommodate the largest

*Table 24 summarizes the differences between the base case scenario and each alternative in the number of UMBs demolished for new construction or converted to another use. It does not include differences in the number of UMBs with additions to building space without changes in use although those situations are included in Tables 21 and 22 under the building outcome category "UMB converted/altered and retrofit to 104(f)". The purpose of Table 24 is to identify changes to the existing stock of commercial/industrial UMBs by location. It is consistent with the subsequent tables that address implications for the existing supply of space in commercial/industrial UMBs. In both instances, the amount of new development or of additions to buildings are not the relevant factors. The upgrading of space with no change in use is discussed qualitatively throughout this chapter and is not quantified in any of the tables.

buildings and the most new office space over the long term. Build-out of all of those sites would result in substantially more new development than could be absorbed under any reasonable forecast of economic and business growth in San Francisco through 2020, however. Thus, demand factors would limit the impacts of the retrofitting requirements on the amount and pace of new development in the C-3-O South. Moreover, if there were substantial increases in the amount of new development as a consequence of the retrofitting requirements, rents for new space would be lower, making the returns from new development lower still in those more risky locations for large office projects.

In the C-3-O South and South of Market areas, there would be effects on the conversion of UMBs to other uses. There would be more conversion of older industrial and warehouse buildings to higher-rent-paying office, retail, and showroom uses than otherwise expected in the 1990-2000 time period, almost exclusively in Alternative 3. In the southeastern industrial areas, the retrofitting requirements would encourage upgrading and remodelling to attract more intensive business activity to outmoded industrial buildings. The requirements also would increase the pace of conversions to live-work space.

Because conversion would trigger retrofitting to the level of Section 104(f) no matter what the general retrofitting requirement was, and relatively high rents would be required to finance the costs of that level of seismic upgrade plus remodeling costs, it would not make sense for building owners to undertake conversion solely as a consequence of the retrofitting requirement under Alternative 1 or Alternative 2. In the case of Alternative 3, however, because seismic upgrading to the level required for conversion would be mandatory before 2000, in some locations building owners that otherwise would have invested in conversion only in the longer term would have a strong incentive to undertake the work sooner. There would be efficiencies in undertaking both seismic upgrading and the remodelling necessary for conversion at the same time.

Another consequence of the retrofitting requirements would be more upgrading and remodelling (without a change in use) to attract higher-rent-paying tenants. Upgrading

induced by the retrofitting requirements would occur in areas where market demand for office and other commercial space is strong. Upgrading would occur in locations attractive to tenants who do not want to pay the rents for space in new office projects. Older commercial space in UMBs in the C-3-O North and South and elsewhere on the periphery of the financial district would be candidates for upgrading. When faced with the retrofitting requirements of Alternative 3 and Alternative 2 (in some cases), building owners that otherwise might have been content to maintain a UMB without major investment might be encouraged to invest in the additional improvements necessary to move-up to a different sub-market if they were required to spend a substantial amount to retrofit and if there were construction efficiencies in combining retrofitting with remodelling.

In areas further south of Market Street, where there is substantial demand for relatively inexpensive space from office and retail activities that are not interested in the higher-rent locations, the retrofitting requirements of Alternatives 1 and 2 would encourage building owners to market their space more aggressively to those users. Those more moderate retrofitting requirements would encourage upgrading without the full-blown conversion to another use that would instead trigger more costly seismic upgrading according to building code Section 104(f). Under Alternative 3, because Section 104(f) would be required of all buildings, and, under the South of Market Plan, tenants for most space converted for office-type activity would be limited to design professional establishments and other arts-related businesses, building owners that converted industrial space might have some difficulty filling that space. There would be some office tenants willing to pay for converted space, but those businesses are not allowed under current zoning. Furthermore, other businesses interested in South of Market space would not pay the rents needed to finance the more costly seismic retrofitting required with Alternative 3.

The other areas where the retrofitting requirements would make the most difference in the timing of development would be neighborhood areas throughout the City. Some new

commercial development would be expected over time in neighborhood areas, primarily mixed-use projects. That development would be most likely to happen on vacant lots or on sites with older one-story buildings. UMBs along neighborhood streets are often one-story garages or other smaller industrial-type buildings that have outlived their original use. Such buildings would be preferred development sites. With requirements to retrofit, there would be strong incentives to proceed with new development. Thus, the relatively large impact of all alternatives on the timing of development in neighborhood areas.

Areas where Retrofitting Requirements Would Have Relatively Moderate Effects on Development Patterns

There would be relatively moderate impacts on development patterns in locations on the periphery of downtown: Northeast Waterfront, Civic Center, Van Ness Avenue, and the Mid-Market area. In the Northeast Waterfront (covering Jackson Square, the Washington-Broadway Corridor, the Northern Waterfront district and Fisherman's Wharf), retrofitting requirements under Alternative 3 would speed demolition of small commercial UMBs for new development. The incentives would be strong in this area on sites where new development would be possible (sites outside historic districts) because of growth in demand over the long term and because of the concentration of unreinforced masonry buildings. Development sites in this area often incorporate more than one UMB, so investment in new development looks more favorable when compared to complying with the relatively costly retrofitting requirements of Alternative 3. In the Civic Center and Van Ness areas, Alternative 3 retrofitting requirements would increase the pace of conversions. Garage buildings and outmoded industrial-type UMBs in the area would be prime candidates for conversion to retail, restaurant, and other higher-intensity uses. In the Mid-Market area, where demand is relatively weak for either new development or conversion, the retrofitting requirements would result in some additional demolition for new construction during the 1990 - 2000 period. Depending on the timing of eventual new development, sites that once contained UMBs could sit vacant for a long time prior to new construction.

Although UMBs are a significant component of the building stock in the Union Square area and Chinatown, the alternatives would not make much difference in the pace of new development or conversions there. New development options are limited by restrictive zoning controls designed to protect existing buildings and existing uses throughout much of these areas. Conversion to higher-rent-paying uses is generally not an issue since most of the buildings are already occupied by office and retail uses. Many of the commercial UMBs are well-suited to the needs of businesses located there. Building values are relatively high. Relatively high revenues from current uses to support investment in retrofitting, in combination with limited new development options, means that building owners would be unlikely to look for alternatives to retrofitting their building.

In strong market areas such as those cited above, the magnitude of the retrofitting investment could trigger other types of building changes that are not quantified In Table 24. Penthouse additions to existing buildings would become more popular development options in blocks on the periphery of Union Square near the office district, as well as in Jackson Square and parts of the Northeast Waterfront. The UMB would be preserved, but the space would be altered and expanded to accommodate more business activity. As with upgrading and remodelling, the retrofitting requirements would encourage that type of development to the extent there were construction efficiencies in undertaking both types of work at the same time.

Areas Where Retrofitting Requirements Would Have Little Effect on Development and Land Use Change

In other locations the retrofitting requirements would not make much difference in expected development and land use change. There would not be much new development or conversion to influence in the North of Market area, along Polk Street, or along the Mission/Valencia commercial corridor. In those areas, demand for additional space is limited. In some instances, zoning restricts the amount of new commercial development allowed, so that not much additional space would be gained from new development. Where some growth in business activity is expected over time in parts of these areas, existing

buildings are adequate to accommodate the smaller-scale commercial and retail businesses likely to need space.

UMBs At Risk of Eventual Demolition

There would be UMBs that become at risk of demolition as a result of the retrofitting requirements. With respect to development patterns and land use, the results for UMBs at risk also indicate where the alternatives might result in **less** activity than expected in the base case. Under the base case scenario, those UMBs would remain standing and could continue to shelter business operations. With retrofitting requirements and without economic assistance to encourage compliance, however, buildings at risk eventually would be demolished, leaving vacant lots where there once was business activity. Table 25 shows the estimates of commercial/industrial UMBs at risk of eventual demolition by location.

The percentages in the table indicate how the locations compare relative to each other and to the average for all commercial/industrial UMBs (represented by the total percent in the last row). Locations with higher than average percentages of commercial/industrial UMBs at risk are areas where demand for space in the **existing** building stock is weak; rents are low; much of the space is vacant or underutilized. The locations also are areas where there would not be enough demand for either new development or converted space to provide development opportunities that might be viewed by owners of UMBs as realistic alternatives to retrofitting. Such relatively slack economic conditions are combined, in some instances, with concentrations of the types of UMBs for which retrofitting costs would be relatively high per square foot.

Substantial numbers of UMBs would be at risk of demolition under Alternative 3, in some locations. In C-3 districts, industrial/warehouse buildings would be at risk. Smaller industrial buildings now housing low-rent-paying commercial activities on mid-block alleys in part of the South of Market area also would be at risk of demolition. Budget tourist hotels in the Tenderloin and the Sixth Street Corridor as well as theater and club buildings

TABLE 25

COMMERCIAL/INDUSTRIAL UMBs AT RISK AS A RESULT OF RETROFITTING ALTERNATIVES: BY LOCATION

Number of Commercial/Industrial UMBs At Risk as a Result of Retrofitting Alternatives

Location	Alternative 1	Alternative 2	Alternative 3
C-3-O North	0	0	0
C-3-O South	9	9	10
Union Square	0	0	0
Mid-Market/C-3-S	6	12	40
Civic Center	1	1	3
SOMA/Rincon Hill	4	5	32
Northeast Waterfront	0	0	0
Chinatown	0	0	0
Van Ness	0	0	0
Polk Street	0	0	0
NOMA/SOCAL	0	5	15
NCDs	0	0	0
Neighborhoods	5	7	8
NC-3	5	7	13
Mission Commercial	2	4	15
Industrial Areas	2	5	18
TOTAL	34	55	154

Percent of Commercial/Industrial UMBs in Each Location At Risk as a Result of Retrofitting Alternatives

	Total UMBs	%	%	%
C-3-O North	65	0	0	0
C-3-O South	104	9	9	10
Union Square	101	0	0	0
Mid-Market/C-3-S	83	7	14	48
Civic Center	51	2	2	6
SOMA/Rincon Hill	210	2	2	15
Northeast Waterfront	123	0	0	0
Chinatown	101	0	0	0
Van Ness	38	0	0	0
Polk Street	33	0	0	0
NOMA/SOCAL	61	0	8	25
NCDs	20	0	0	0
Neighborhoods	40	13	18	20
NC-3	33	15	21	39
Mission Commercial	54	4	7	28
Industrial Areas	54	4	9	33
TOTAL	1,171	3	5	13

NOTE: In the absence of economic assistance to encourage retrofitting, UMBs at risk eventually would be demolished. UMBs at risk are unlikely to be retrofit, given the high costs of retrofitting relative to building value.

SOURCE: Recht Hausrath & Associates

in the downtown area and in scattered neighborhood locations would be candidates for eventual demolition. In locations where commercial or industrial demand is relatively weak, such as the North of Market area, some older commercial corridors, and parts of southeastern industrial areas, larger commercial and industrial buildings that could exist in the base case with high vacancies or large amounts of underutilized space would not justify the economics of retrofitting. In the absence of economic assistance to owners to encourage retrofitting, demolition would be the eventual result.

Where there would be large percentages of buildings at risk under Alternative 3, the retrofitting requirements of Alternatives 1 and 2 would not have the same impact. The difference would be that, in more cases under the less costly retrofitting alternatives, building value (although low) would support the retrofitting investment. In other words, owners would be better off retrofitting the UMB, thereby retaining some tenants and generating income from the property, by comparison to demolishing the building with no prospects for alternative uses for the site in the foreseeable future. In areas where the real estate market is particularly weak (Mid-Market blocks between Sixth and Eighth Streets, and parts of the C-3-O South of Market Street) and for isolated, outmoded commercial and industrial facilities in outlying areas, the retrofitting requirements of Alternatives 1 and 2 also could result in substantial numbers of UMBs at risk.

Parking lots on some sites cleared of UMBs at risk, particularly sites in the C-3 districts and neighborhood districts, would be attractive alternatives to retrofitting. Existing City policy discourages and, in some locations, prohibits such development, however. If that were not the case, demolition of UMBs to be replaced with paved parking lots would be a more significant element of the alternatives' impacts on development patterns and land use.

There are locations where no commercial/industrial UMBs are likely to be at risk of demolition. They are areas where economic activity is strong, and building values could

support the investment in retrofitting. Moreover, in some of those areas, new development or conversion opportunities would offer alternatives to retrofitting.

Impacts on the Supply of Commercial/Industrial Space

Building outcomes and different development patterns and land use changes would be evident as impacts on the supply of space of various types in the various locations in which commercial/industrial UMBs are concentrated. In some segments of the real estate market, the effects of retrofitting requirements on the timing of demolition for new construction, on conversion of UMBs to other uses, and on upgrading and remodelling would mean less space, lower vacancy rates, and higher rents than otherwise would be the case. The demolition of space in commercial/industrial UMBs at risk also would contribute to the loss of space for business activity in some real estate sub-markets. The other aspect of impacts on the timing of new development, conversion, and upgrading would be more new and converted space for some time, compared to what would be expected in the base case. As a result, there would be more space available, higher vacancy rates, and lower rents in other segments of the real estate market.

Tables 26 - 29 translate the differences in building outcome results for commercial/ industrial UMBs to estimates of amounts of space that would be demolished for new construction, converted to other uses, or demolished because retrofitting was not feasible. The first table (Table 26) summarizes the overall consequences of each alternative for the supply of space represented by commercial/industrial UMBs. The following tables present more detailed analysis of each type of impact [differences in the timing of demolition for new construction (Table 27), differences in the timing of conversion (Table 28), and the amount of space demolished in UMBs at risk as a result of the retrofitting requirements (Table 29)], showing the impacts for each commercial/industrial use category.

TABLE 26

SUMMARY OF IMPLICATIONS OF THE RETROFITTING ALTERNATIVES FOR THE SUPPLY OF SPACE IN COMMERCIAL/INDUSTRIAL UMBs

	Alternative 1	Alternative 2	Alternative 3
Difference in Space Demolished for New Construction, 1990 - 2000/a/	36,935	221,305	447,508
Difference in Space Converted to Other Uses, 1990 - 2000/a/	267,161	435,629	1,035,280
Subtotal	**304,096**	**656,934**	**1,482,788**
Space in UMBs At Risk of Demolition/b/	186,698	823,725	2,567,975
TOTAL	**490,794**	**1,480,659**	**4,050,763**
Percent of Total Space In Commercial/Industrial UMBs (20,122,938 sq. ft.)	2.4%	7.4%	20.1%

/a/ The differences represent the larger amount of space in UMBs demolished for new construction or converted to other uses in the shorter term as a consequence of retrofitting requirements, by comparison to the base case scenario.

/b/ UMBs at risk are unlikely to be retrofit, given the high costs of retrofitting relative to building value. In the absence of economic assistance to encourage retrofitting, UMBs at risk eventually would be demolished.

SOURCE: Recht Hausrath & Associates

TABLE 27

EFFECTS OF RETROFITTING ALTERNATIVES ON COMMERCIAL/INDUSTRIAL SPACE DEMOLISHED FOR NEW CONSTRUCTION: 1990 - 2000

Additional Space Demolished as a Result of Retrofitting Alternatives

Use	Alternative 1	Alternative 2	Alternative 3
Commercial	7,220	59,816	132,823
Office	3,894	3,894	90,390
Commercial in Industrial Building	0	0	0
Industrial/Warehouse	4,527	86,681	121,681
Garage	21,294	33,894	33,894
Hotel	0	0	0
Theater/Club	0	37,020	68,720
TOTAL	36,935	221,305	447,508

Percent of Space in Each Use Category Demolished as a Result of Retrofitting Alternatives

	Total Square Feet	%	%	%
Commercial	6,349,681	0.11	0.94	2.09
Office	4,359,545	0.09	0.09	2.07
Commercial in Ind. Bldg.	1,932,478	0.00	0.00	0.00
Industrial/Warehouse	5,322,141	0.09	1.63	2.29
Garage	837,444	2.54	4.05	4.05
Hotel	877,313	0.00	0.00	0.00
Theater/Club	444,336	0.00	8.33	15.47
TOTAL	20,122,938	0.18	1.10	2.22

NOTE: The differences represent the larger amount of space in UMBs demolished in the shorter term as a consequence of retrofitting requirements, compared to the amount of space in UMBs demolished in the base case scenario.

SOURCE: Recht Hausrath & Associates

TABLE 28

EFFECTS OF RETROFITTING ALTERNATIVES ON CONVERSION OF COMMERCIAL/INDUSTRIAL SPACE: 1990 - 2000

Additional Space Converted as a Result of Retrofitting Alternatives

Use	Alternative 1	Alternative 2	Alternative 3
Commercial	7,546	7,546	7,546
Office	42,992	42,992	42,992
Commercial in Industrial Building	0	0	0
Industrial/Warehouse	198,198	366,666	929,106
Garage	0	0	37,211
Hotel	0	0	0
Theater/Club	18,425	18,425	18,425
TOTAL	267,161	435,629	1,035,280

Percent of Space in Each Use Category Converted as a Result of Retrofitting Alternatives

	Total Square Feet	%	%	%
Commercial	6,349,681	0.12	0.12	0.12
Office	4,359,545	0.99	0.99	0.99
Commercial in Ind. Bldg.	1,932,478	0.00	0.00	0.00
Industrial/Warehouse	5,322,141	3.72	6.89	17.46
Garage	837,444	0.00	0.00	4.44
Hotel	877,313	0.00	0.00	0.00
Theater/Club	444,336	4.15	4.15	4.15
TOTAL	20,122,938	1.33	2.16	5.14

NOTE: The differences represent the larger amount of space in UMBs converted to other uses in the shorter term as a consequence of retrofitting requirements, compared to the amount of space in UMBs converted in the base case scenario.

SOURCE: Recht Hausrath & Associates

TABLE 29

COMMERCIAL/INDUSTRIAL SPACE AT RISK AS A RESULT OF RETROFITTING ALTERNATIVES: BY USE

Amount of Space At Risk as a Result of Retrofitting Alternatives

Use	Alternative 1	Alternative 2	Alternative 3
Commercial	40,888	268,924	923,981
Office	10,580	74,837	186,372
Commercial in Industrial Building	16,166	100,766	392,747
Industrial/Warehouse	99,802	195,934	550,717
Garage	16,862	29,308	57,041
Hotel	0	23,470	286,628
Theater/Club	2,400	130,486	170,489
TOTAL	186,698	823,725	2,567,975

Percent of Space in Each Use Category At Risk as a Result of Retrofitting Alternatives

	Total Square Feet	%	%	%
Commercial	6,349,681	0.64	4.24	14.55
Office	4,359,545	0.24	1.72	4.28
Commercial in Ind. Bldg.	1,932,478	0.84	5.21	20.32
Industrial/Warehouse	5,322,141	1.88	3.68	10.35
Garage	837,444	2.01	3.50	6.81
Hotel	877,313	0.00	2.68	32.67
Theater/Club	444,336	0.54	29.37	38.37
TOTAL	20,122,938	0.93	4.09	12.76

NOTE: The table shows space in commercial/industrial UMBs that would be at risk of eventual demolition. In the absence of economic assistance, UMBs at risk are unlikely to be retrofit, given the high costs of retrofitting relative to building value.

SOURCE: Recht Hausrath & Associates

Outcomes Resulting in Less Space than in the Base Case Scenario

The summary in Table 26 indicates the total amount of commercial/industrial space in UMBs that would be affected by the retrofitting requirements such that space would no longer serve the same function in the real estate market. Depending on the alternative, that amount would range from about 2% to 20% of the total commercial/industrial space in UMBs. By that measure, the impacts of Alternative 1 on the supply of space and on real estate market conditions would be minimal. There would be impacts for about 500,000 square feet of space. Under Alternative 2, there would be impacts for about 1.5 million square feet of space; there would be more space lost to demolition as more new development projects would go ahead sooner, and more UMBs would be demolished because retrofitting would not be feasible with the income stream from current uses. The summary highlights the substantial difference for commercial/industrial space in UMBs under Alternative 3. That retrofitting requirement would influence the real estate market function of about four million square feet--one-fifth of all UMB space. Most of that space would be in buildings at risk of demolition.

All of the categories shown in the table represent space that would be taken out of existing real estate sub-markets. Space demolished for new construction would be simply removed from the inventory; space converted to other uses would not be lost but would serve a different segment of the real estate market. Both of those changes in the function of the space in commercial/industrial UMBs would be expected in the base case, only at a later date. Under Alternative 1, the shift of space from one sub-market to another as a result of conversions would be the largest component of the relatively moderate impact of the retrofitting requirement on the existing inventory of space in commercial/industrial UMBs. Under Alternatives 2 and 3, however, the amount of space in buildings at risk of eventual demolition would be substantially larger than in Alternative 1 and would be the largest component of impact on the supply of commercial/industrial space. Loss of space in buildings at risk would be the most striking impact of the retrofitting requirements because

the buildings would be gone and, for a long time, it is unlikely that anything else would take their place.

Table 27 presents in more detail how the impact of the retrofitting requirements on demolition for new construction would affect the supply of space in various real estate sub-markets. The table shows the additional space that would be demolished for new construction during the 1990-2000 period, by use category. The percentages indicate the relative importance of that amount to the inventory of space in UMBs of each type. Across all alternatives, garage buildings would account for higher than average percentages of the additional space lost to demolition for new construction during this time period. Relatively large percentages of the space in theater and club buildings would be demolished for new development sooner under Alternatives 2 and 3. In general, the loss of those types of buildings (garages, theaters, and clubs) to new development projects would not have a significant impact on real estate market conditions because such buildings are often outmoded and relatively more difficult to adapt to activities that would be more suited to their locations.

A faster pace for conversion of UMBs would mean that other parts of the inventory of space in commercial/industrial UMBs would shift from one real estate sub-market to another. Table 28 shows the amount of space in commercial/industrial UMBs by existing use category that would be converted to another use earlier than otherwise expected, as a consequence of the retrofitting requirements. The alternatives would have the most impact on the stock of industrial/warehouse space in unreinforced masonry buildings. That is not surprising, since those are the most likely candidates for conversion in any case. Under Alternative 3, almost one-fifth of the space in industrial/warehouse UMBs (about one million square feet) would be converted during the 1990-2000 period as a result of retrofitting requirements. Those conversions would reduce the stock of lower-cost service/industrial space.

In addition, retrofitting requirements would result in more upgrading and remodeling that would change the real estate sub-markets served by some UMB space. Upgrading would reduce the supply of lower-cost office, retail, and service/commercial space. The amount of space remodelled to attract higher-rent-paying tenants has not been quantified. Given the cost differentials among the alternative retrofitting requirements and the resultant building investment decisions faced by owners, the impacts of this type of change in the supply of space would be greatest under Alternative 3 and smallest under Alternative 1.

Buildings at risk of eventual demolition would be the largest component of the unreinforced masonry building stock that could be lost as a consequence of the retrofitting requirements. Table 29 presents estimates of the amount of space in UMBs at risk, by use category, for each alternative. By contrast to demolition for new construction and conversions to other uses, where impacts would be concentrated in a few use categories and thus in a few real estate sub-markets, there would be space at risk of demolition in all use categories.

Generally, across all use categories, UMBs at risk include buildings in lower-rent locations, some that are largely vacant or underutilized, buildings with inefficient layouts or sizes, and buildings in poor condition. They also are often building types that could be particularly costly to retrofit. Finally they are often located in weak market areas where new development would be risky or otherwise difficult to undertake. For the most part, sizable amounts of the inventory in each use would be lost only under Alternative 3. Particularly vulnerable building types include theaters and clubs, budget tourist hotels, and small industrial buildings. A relatively large proportion of the space in theater and club buildings would be at risk of demolition under Alternative 2 as well as Alternative 3.

Outcomes Resulting in More Space than in the Base Case Scenario

A faster pace for conversions would mean more than the loss of some of the existing inventory of space in commercial/industrial UMBs. Conversion would decrease the supply of space for some users and increase the supply available for others. Most conversions

would be to office use, with some conversions to hotel, retail, showroom, live-work, and mixed higher-rent-paying uses, depending on the location. The additional inventory of converted space would be largest under Alternative 3; about one million square feet would be converted sooner than otherwise expected.

Similarly, the economic incentives that the retrofitting requirements would provide to owners of UMBs on sites in strong market positions would result in increases in the supply of new space in some real estate sub-markets. With more new construction in the 1990 - 2000 period, there would be more space to be absorbed in new projects, at least for some time. Some of those would be large downtown projects; others would be moderate-sized new development near the downtown area or smaller projects along active neighborhood streets. Upgrading and penthouse additions also would expand the supply of space suitable for small offices and for retail activity.

Impacts for Businesses in terms of the Availability and Cost of Space

In combination, all of the above-described impacts on the supply of space in commercial/industrial UMBs would have some impact on the availability of space and on rents in certain sub-markets. Thus, retrofitting requirements for UMBs would result in somewhat different space options and space costs for businesses. The impacts would pertain to some degree under all alternatives, but particularly under Alternative 3.

As a consequence of a faster pace at which UMBs would be demolished for new construction or converted to other uses, in addition to more upgrading and remodelling, there would be less space at the lower end of the rent spectrum for office, retail and service/commercial uses and less space for industrial, distribution, repair and related businesses. Particularly under Alternative 3, with relatively large amounts of space in UMBs at risk, the space options would be constrained. Consequently, there would be lower vacancies and higher rents for older, relatively unimproved space in certain locations. The western South of Market and Mid-Market areas are locations in which the impacts on space

supply and rents would be most evident. In addition, some categories of uses--older service establishments, auto repair and industrial and distribution facilities scattered mostly in eastern parts of the City--could find their space options in the City particularly limited under Alternative 3.

When occupants of buildings affected by the retrofitting requirements have to vacate, that would add to demand pressure on the space supply at the lower-end of the rent spectrum. Some businesses that would look for that type of space would locate elsewhere, probably outside San Francisco. Others that needed to be near downtown clients or convenient to a San Francisco labor force would stay in the City. Those businesses would pay more for space than they otherwise would. Some could pass those additional costs along to clients and customers.

In some areas, particularly around Union Square and other North of Market locations, the impacts of the loss of lower-cost office and commercial space in these and other areas would be tempered by incentives for owners to lease upper-floor space that otherwise might remain largely vacant or underutilized.

At another level in the real estate market, the retrofitting requirements would result in some oversupply of space, at least for some time, and relatively lower rents than otherwise would be expected. Because the retrofitting requirements of Alternative 2 and, in particular, Alternative 3, would speed the pace of some new development and conversion projects, there would be somewhat more new and converted space available and thus lower rents overall in some sub-markets. For the most part, the rent impacts would be relatively short-term adjustments in response to the larger amounts of space that would come on the market during the enforcement period for the retrofitting program. Nevertheless, for at least some time, there would be more opportunities for those businesses willing to pay for renovated or new space. Those businesses would have more choices and probably would pay lower rents than otherwise. The greater availability of that type of space would not make

much difference for most of those businesses feeling the constraints on supply at the lower end of the market, however.

Overall, the retrofitting requirements are not likely to result in significant differences in commercial/industrial real estate market conditions in San Francisco under Alternatives 1 and 2. The effects would be more significant under Alternative 3, however. With those retrofitting requirements, the loss of lower-cost space in some sub-markets would have longer term repercussions for some businesses and for business costs.

Implications for Commercial/Industrial Building Owners

Based on the discussions above, it can be concluded that, over the longer term, the owners of commercial/industrial UMBs would bear the costs of the retrofitting requirements under Alternatives 1 and 2. Only under Alternative 3 would tenants in some real estate sub-markets pay some of the costs in terms of reduced availability of space and resultant higher rents in the future. In those cases, UMB owners would bear the rest of the costs. Owners of commercial/industrial UMBs in other sub-markets where rents would not be affected by the requirements would bear the full costs of retrofitting under Alternative 3.

Under Alternatives 1 and 2, and for real estate sub-markets where rents would not be affected by the requirements under Alternative 3, existing owners of UMBs (and possibly lenders with existing loans on UMBs) would bear the costs of retrofitting. For real estate sub-markets where higher rents would be expected over the longer term as a result of the retrofitting requirement under Alternative 3, existing owners of UMBs in these sub-markets would bear the costs but eventually would receive some "repayment" in terms of higher revenues from rents if they continued to own the building in the future. If the building were sold, future owners might actually receive the additional revenues from higher rents in the future since the effects of retrofitting would occur over time as the market adjusts to changes in space supply. Whether future owners also would have shared in the costs of retrofitting would depend on the timing of the sale and the price paid for the property.

The effects of retrofitting under Alternative 3 in terms of higher rents for space in some sub-markets (those providing lower-cost, older, relatively unimproved space in certain locations) would extend to owners of all buildings with space serving the affected sub-markets, not just to owners of UMBs. In fact, because it is the loss of UMBs that reduces the supply of space, many of the beneficiaries of higher rents would be owners of non-UMB properties. Those owners would benefit from the effects of the requirements (in terms of higher rents) without having to pay the costs of retrofitting. Similarly, the shorter-term effects under Alternative 2 and, particularly, Alternative 3 in terms of lower rents for new or converted space (because the retrofitting requirements would speed the pace of some new development and conversions) would extend to owners of all buildings serving the affected sub-markets.

IMPLICATIONS OF RESIDENTIAL BUILDING OUTCOMES

Implications for Development Patterns and Land Use Change

City zoning controls and policies designed to protect the existing housing stock would limit development options open to owners of residential UMBs. By contrast to commercial/industrial UMBs, residential UMBs are more concentrated in areas where existing buildings are protected by prohibition of demolition (Chinatown), conditional use procedures for demolition of housing, or height and density limits set close to the existing building envelope to discourage new construction. In addition, the Residential Hotel Conversion and Demolition Ordinance incorporates significant disincentives to new development or conversion of property containing residential hotel units. Many of those buildings are UMBs.

Consequently, not much new development or conversion would be expected in the base case scenario for residential UMBs. Furthermore, as noted in the preceding summary of building outcomes for residential UMBs, the retrofitting alternatives would not make much

difference in the amount or timing of those types of land use change. There would be some important distinctions by location, however, that are discussed below.

The more significant impact with respect to residential UMBs would be the large numbers of residential UMBs at risk of eventual demolition. This impact follows from the findings that retrofitting would be relatively more costly per square foot for residential buildings and that rental income to support the costs of retrofitting would be limited, as would development options that could be alternatives to retrofitting. The extent of UMBs at risk varies by location as discussed below.

Table 30 summarizes the differences for the 1990-2000 period between each alternative and the base case scenario in terms of the number of residential UMBs that would be demolished for new construction or converted sooner than otherwise would be the case. The results are presented in total and by location. Given their locations, residential UMBs generally would be demolished to be replaced with projects combining residential with retail and parking uses. In some locations, tourist-serving new development also would be an option. All conversions of residential UMBs would be to tourist hotel use.

Alternative 3 would result in the most substantial impacts for the timing of potential development of residential UMB sites. In addition, the relatively high costs of Alternative 3 retrofitting would increase the incentive for conversion to tourist use, resulting in more of that type of activity than would occur in the base case. The impacts would be particularly notable in Downtown, North Beach, North Van Ness, and South of Market locations.

There are not many UMBs remaining in residential use in the Downtown area. Those situated near the North of Market area and around Union Square and Chinatown are hotels serving tourists as well. Many are prime candidates for upgrading to full tourist use. By comparison to undertaking the retrofitting costs required under both Alternatives 2 and 3,

TABLE 30

EFFECTS OF RETROFITTING ALTERNATIVES ON RESIDENTIAL DEVELOPMENT AND CONVERSIONS: 1990 - 2000, BY LOCATION

Additional Residential UMBs Demolished or Converted as a Result of Retrofitting Alternatives

Location	Alternative 1	Alternative 2	Alternative 3
Bush Corridor	1	1	2
Chinatown	0	0	1
North Beach	3	5	6
Downtown	0	5	6
North of Market	1	4	11
NOMA 6th Street	0	0	1
South of Market	0	0	2
SOMA 6th Street	0	0	0
Civic Center\So. Van Ness	0	0	0
Mid Van Ness	0	0	0
North Van Ness	0	2	7
Mission	1	1	1
Outlying	1	1	1
TOTAL	7	19	38

Percent of Residential UMBs in Each Location Demolished or Converted as a Result of Retrofitting Alternatives

	Total UMBs	%	%	%
Bush Corridor	180	0.56	0.56	1.11
Chinatown	207	0.00	0.00	0.48
North Beach	30	10.00	16.67	20.00
Downtown	12	0.00	41.67	50.00
North of Market	133	0.75	3.01	8.27
NOMA 6th Street	36	0.00	0.00	2.78
South of Market	12	0.00	0.00	16.67
SOMA 6th Street	23	0.00	0.00	0.00
Civic Center/So. Van Ness	9	0.00	0.00	0.00
Mid Van Ness	22	0.00	0.00	0.00
North Van Ness	36	0.00	5.56	19.44
Mission	26	3.85	3.85	3.85
Outlying	62	1.61	1.61	1.61
TOTAL	788	0.89	2.41	4.82

NOTE: The differences represent the larger number of UMBs in the 1990-2000 period that would be demolished for new construction or converted to another use, compared to the number of UMBs affected by development in the base case scenario.

SOURCE: Recht Hausrath & Associates

those building owners would be better off, from a real estate investment perspective, completing conversion to tourist use (including the additional development costs of the buy-out provision of the Residential Hotel Conversion and Demolition Ordinance). In most cases, the conversion would not make economic sense in the base case scenario. As a result, there would be some additional conversion to tourist hotel use under Alternatives 2 and 3.

In other areas near downtown, and in North Beach (areas of C-2 zoning near Jackson Square and the Financial District), the retrofitting requirements would speed the pace of a few new development projects, especially on sites where several UMBs could be assembled to create one larger parcel. South of Market, North of Market near Civic Center and Van Ness Avenue, and locations further north along Van Ness are areas where smaller new mixed-use projects could find market support over the longer term; the costs of complying with the retrofitting requirements of Alternative 3 could encourage owners to consider new development sooner.

In other areas, there would not be much new development or conversion to influence. In Chinatown, the Bush Corridor, and much of the North of Market area, zoning controls limit the amount of new development that could be accommodated on a site. While there would be cases in Chinatown in which market incentives would favor new housing development because of the substantially higher prices or rents that could be obtained in new construction by comparison to existing units, City policy prohibits demolition of existing housing in that area. In the Bush Corridor and North of Market area, many of the existing buildings are larger than what could be built today, so there is little incentive for new development. Moreover, in several of the areas where residential UMBs are concentrated, the private-sector housing market is not strong enough to encourage new development. The combination of market factors and zoning constraints means that the gain from new development is not substantially larger than the value of the existing building.

As a result of limited potential for new development, the greater impact of the retrofitting requirements on the housing stock in various locations is illustrated by residential UMBs at risk of demolition. Table 31 presents those estimates by location.

There would not be many residential UMBs at risk of demolition in any locations as a consequence of the retrofitting requirements of Alternative 1. Under Alternative 2, however, in locations South of Market, North of Market, and in Chinatown, relatively high percentages of residential UMBs would fall into that category. Under Alternative 3, the pattern would be more universal. In the North of Market area and parts of South of Market, a substantial majority of the residential UMBs could be at risk of demolition because retrofitting would not be feasible.

The large number of residential UMBs at risk is explained by relatively low rents (partly due to the limits imposed by the Residential Rent Stabilization Ordinance), by relatively high costs of retrofitting, and by the lack of development potential to provide alternatives to retrofitting. The presence of residential rent control makes a difference in building outcomes to the extent that rents for occupied units are below market levels. In areas with relatively high rates of turnover, rents are closer to market levels and rent control does not make as much difference in building outcomes. Rent control would make the most difference in buildings occupied by many long-term tenants. That would be the case for apartments in Chinatown, North Beach, and parts of the North of Market area, and in other residential UMBs scattered throughout the City. The impacts of residential rent control on the likelihood that UMBs in Chinatown and North Beach would be at risk and eventually demolished would be moderated somewhat by the income generated from ground-floor commercial space, particularly along busy commercial streets.

Impacts on the Housing Stock

Although the expected course of new development and conversion affecting residential UMBs would be relatively limited, the alternatives would have some impact on the timing

TABLE 31

RESIDENTIAL UMBs AT RISK AS A RESULT OF RETROFITTING ALTERNATIVES: BY LOCATION

Number of Residential UMBs At Risk as a Result of Retrofitting Alternatives

Location	Alternative 1	Alternative 2	Alternative 3
Bush Corridor	0	5	20
Chinatown	6	21	47
North Beach	0	0	7
Downtown	0	0	0
North of Market	1	23	75
NOMA 6th Street	0	5	26
South of Market	0	2	3
SOMA 6th Street	1	8	17
Civic Center\So. Van Ness	0	0	4
Mid Van Ness	0	2	4
North Van Ness	0	1	6
Mission	0	0	10
Outlying	0	0	4
TOTAL	8	67	223

Percent of Residential UMBs in Each Location At Risk as a Result of Retrofitting Alternatives

	Total UMBs	%	%	%
Bush Corridor	180	0	3	11
Chinatown	207	3	10	23
North Beach	30	0	0	23
Downtown	12	0	0	0
North of Market	133	1	17	56
NOMA 6th Street	36	0	14	72
South of Market	12	0	17	25
SOMA 6th Street	23	4	35	74
Civic Center/So. Van Ness	9	0	0	44
Mid Van Ness	22	0	9	18
North Van Ness	36	0	3	17
Mission	26	0	0	38
Outlying	62	0	0	6
TOTAL	788	1	9	28

NOTE: In the absence of economic assistance to encourage retrofitting, UMBs at risk eventually would be demolished. UMBs at risk are unlikely to be retrofit, given the high costs of retrofitting relative to building value.

SOURCE: Recht Hausrath & Associates

of changes to the existing building stock. Table 32 shows what the alternatives would mean for housing units in UMBs during the enforcement period for the retrofitting requirements (assumed to be 1990 - 2000 for this analysis).

Generally, the number of units subject to different schedules for demolition and conversion as a consequence of the retrofitting requirements would not be large, since not much change would be expected without the retrofitting requirements. Under Alternative 1, less than one percent of total housing units would be lost early due to either demolition for new construction or conversion undertaken as an alternative to fulfilling the seismic retrofitting requirement. Alternative 2 would have greater impact. Under the more costly requirements, the significant difference would be for residential hotel units, primarily those in mixed residential-tourist hotel buildings. The numbers illustrate the conclusion identified above: the costs of retrofitting for some buildings under Alternative 2 would, by comparison, encourage building owners to undertake full conversion, including the cost of replacement residential units. By Alternative 3, that impact on the stock of residential hotel units in UMBs would be most pronounced. About 15 - 20% of the existing residential units in those types of UMBs would be lost through conversion or demolition as a result of the retrofitting requirements.

A potentially more serious impact of the retrofitting requirements (depending on the alternative) could be the ultimate fate of buildings at risk. In the absence of particular mitigation programs, those buildings eventually would be demolished, and there would be significant impacts for the housing stock. Table 33 presents the estimates of residential units likely to be at risk of demolition, by residential use category, for each alternative.

Alternative 1 would result in a small number of housing units ultimately at risk of demolition (about 80 units--less than one percent of the total). Most would be in apartment buildings with no commercial space to help offset the costs of the retrofitting work. Units at risk under Alternative 1 would be in buildings that would be particularly costly to

TABLE 32

EFFECTS OF RETROFITTING ALTERNATIVES ON HOUSING UNITS
CONVERTED OR DEMOLISHED FOR NEW CONSTRUCTION: 1990 - 2000

Additional Units Converted or Demolished as a Result of Retrofitting Alternatives

Type of Housing	Alternative 1	Alternative 2	Alternative 3
Dwellings/Flats without commercial	0	0	9
Flats with commercial	9	9	23
Apartments with commercial	0	28	37
Apartments without commercial	53	140	256
Residential Hotels	0	70	266
Mixed Hotels	67	444	730
TOTAL	129	691	1,321

Percent of Units in each Housing Type Converted or Demolished as a Result of Retrofitting Alternatives

	Total Units	%	%	%
Dwellings/Flats without commercial	172	0	0	5.23
Flats with commercial	145	6.21	6.21	15.86
Apartments with commercial	5,930	0	0.47	0.62
Apartments without commercial	5,201	1.02	2.69	4.92
Residential Hotels	6,179	0	1.13	4.30
Mixed Hotels	4,128	1.62	10.76	17.68
TOTAL	21,755	0.59	3.18	6.07

NOTE: The differences represent the larger number of units that would be demolished for new construction or converted in the shorter term as a consequence of retrofitting requirements, compared to the number of units demolished or converted in the base case scenario. All conversions would be to tourist hotel units.

SOURCE: Recht Hausrath & Associates

TABLE 33

HOUSING UNITS AT RISK AS A RESULT OF RETROFITTING ALTERNATIVES: BY TYPE OF HOUSING

Number of Units At Risk as a Result of Retrofitting Alternatives

Type of Housing	Alternative 1	Alternative 2	Alternative 3
Dwellings/Flats without commercial	3	3	10
Flats with commercial	0	0	4
Apartments with commercial	0	190	2,582
Apartments without commercial	60	400	2,412
Residential Hotels	15	1,227	3,819
Mixed Hotels	0	91	1,087
TOTAL	78	1,911	9,914

Percent of Units in Each Housing Type At Risk as a Result of Retrofitting Alternatives

	Total Units	%	%	%
Dwellings/Flats without commercial	172	1.74	1.74	5.81
Flats with commercial	145	0	0	2.76
Apartments with commercial	5,930	0	3.20	43.54
Apartments without commercial	5,201	1.15	7.69	46.38
Residential Hotels	6,179	0.24	19.86	61.81
Mixed Hotels	4,128	0	2.20	26.36
TOTAL	21,755	0.36	8.78	45.57

NOTE: The table shows housing units in UMBs that would be at risk of eventual demolition. In the absence of economic assistance, UMBs at risk are unlikely to be retrofit; given the high costs of retrofitting relative to building value.

SOURCE: Recht Hausrath & Associates

retrofit, with many long-time tenants whose rent increases have been limited by rent control for as many as five to ten years.

More of the housing stock would be at risk of demolition under Alternative 2 (about 1,940 units--9% of all units in UMBs). There would be significant variations by use. Almost one-fifth of all units in residential hotels would be at risk. Many of those cases represent situations in which high retrofit costs would be paired with buildings that have high average vacancies and low rents. Units in apartment buildings, particularly those with no commercial space, also would be particularly vulnerable.

The potential for losses in the housing stock is striking under the retrofitting requirements of Alternative 3. In total, about 9,900 units could be lost. The table shows proportionally more units at risk (about 46% in Table 33) than buildings at risk (29% in Table 31). This indicates that the larger residential structures would have the most difficulty complying with costly retrofitting requirements. Many of the larger buildings have lower rents due both to their locations and to the fact that they are covered by rent control. The larger buildings also are relatively costly to retrofit due to their building prototype and to the characteristics of construction and relatively long duration for retrofitting, requiring relocation payments to tenants and also resulting in lost revenues for owners.

More than half of the units in residential hotels would be at risk of eventual demolition. About 45% of the units in apartment buildings and 26% of the units in mixed residential-tourist hotels would be at risk of demolition. By contrast, only a few units in single-family homes and flats would share that designation.

As with commercial/industrial space, the retrofitting requirements could trigger changes to the housing stock that are not quantified here. There could be upgrading of older units in UMBs at the time the retrofit work would be undertaken. In most cases, however, protection for existing tenants and limits on the pass-through provisions of the rent control ordinance would limit the potential for landlords to undertake more costly remodeling than

would be required by seismic retrofitting work alone. Owners of small buildings (four or fewer units) not covered by the rent control ordinance might take advantage of the efficiencies of combining retrofitting with more substantial remodelling and thus move their property into a higher rental sub-market. Similarly, there could be some instances in which the retrofitting requirements precipitated conversion of rental units to condominiums.

Those types of changes would be limited to areas where market rents or prices could justify the higher level of investment. Probable locations would be along the slopes of Nob Hill and along Van Ness Avenue towards Pacific Heights, and potentially scattered UMB sites in eastern parts of the City. While housing units would not be lost, there would be impacts for existing tenants. Market factors and the Residential Rent Stabilization Ordinance would limit landlords' ability to upgrade or convert many residential units in locations where residential UMBs are concentrated, in and around the downtown.

Impacts for Households and Population in terms of the Availability of Housing and Rents

Impacts Due to Loss of Housing Units

Conclusions about the full magnitude of the impacts of the retrofitting alternatives on the housing stock and for households and population in the City depend to a large extent on the disposition of residential UMBs that would be at risk of eventual demolition, in the absence of economic assistance for retrofitting. Overall, by contrast to the situation for commercial/industrial UMBs, the retrofitting alternatives would not result in substantial differences in the housing supply because of impacts on the timing of new development or conversion.

The exception would be residential hotel units, particularly those in buildings already serving as both permanent housing and tourist lodging. Alternatives 2 and 3 (particularly the latter) could result in sizable losses in that segment of the housing market, primarily

as a consequence of conversions to tourist use. Such conversions could only proceed, however, if the developers contributed funds to the City for replacement housing. Existing regulations thus provide a mechanism to mitigate the loss of the existing units in UMBs. Nevertheless, the short-term impacts for residents of residential hotel units undergoing conversion could include displacement, difficulties finding another place to live, and, potentially, higher rents.

Losses of units in UMBs at risk would have severe impacts in areas where UMBs represent much of the existing housing stock, such as parts of the North of Market district, Chinatown, and the Sixth Street Corridor. Vacancy rates are already low. Those areas are among the few places where people whose housing options are limited can find housing. Residents include many elderly people, immigrants, low-income single people and families, and others with special needs. (See Chapter II for description of the characteristics of the population in neighborhoods in which UMBs are concentrated.)

The loss of housing, particularly under Alternative 3, would have serious impacts for both existing tenants displaced from their units and, over the longer term, for future households seeking lower-cost housing. Those people have only limited resources to pay for housing. Many also have few other housing options, since they need to be near the social services and community resources that exist in Chinatown and North of Market. If such a large amount of the housing stock were unavailable for occupancy, those households would have to further crowd their living situation by moving in with family or sharing housing. There would be more homeless, since many are already living in a "last resort" situation.

Perhaps only in the Bush Corridor under Alternative 3 would the overall level of market rents increase as a result of losses to the housing stock in response to the retrofitting requirements. Overall rent impacts would be limited by the ability of tenants to pay. Those segments of the housing market most affected would be relatively limited sub-markets (defined relatively narrowly in terms of location and type of housing), so it is unlikely there would be repercussions throughout the housing market.

Impacts When UMBs Would be Retrofit

In those situations in which UMBs would be retrofit, existing tenants of residential UMBs covered by the Residential Rent Stabilization Ordinance would have to pay higher rents than they would pay without the retrofitting requirements. Under the rules governing rent increases for capital improvements such as retrofitting, annual increases in rents would be limited each year to 10% of the rent that would be paid excluding any increases for retrofitting. Those annual increases would accumulate over the years until the total amount of additional rent for retrofitting equaled the annual amortized cost of retrofitting. There also would be a market limit beyond which landlords would not be able to pass through costs of retrofitting to tenants. Once either of those "limits" was reached, the total additional rent would remain at that level for subsequent years until the unit's share of retrofitting costs was paid. Rents would return to the amounts they would have been without the addition for retrofitting once the unit's share of costs was paid.

As a consequence of the disruption associated with retrofitting, some tenants might not remain in their unit. Those tenants would pay market rents for alternative housing. Those market rents probably would be higher than the rent-controlled rents those tenants otherwise would pay to remain in their existing unit without retrofitting.

The extent of potentially higher rents for existing tenants remaining in their retrofitted units is summarized below in terms of whether tenants would eventually be paying market rents for a period of time as a result of retrofitting, or whether they would be paying rents that remain below market levels even though those rents are higher because of retrofitting. The total increase in rents that existing tenants would pay depends on how long they remain in the unit and/or the number of annual increases in rents that would occur before one of the limits on additional increases would be reached. The results vary for apartments and residential hotel units. Back-up tables for the results described in the following text are provided in Appendix 3 (see particularly Appendix Tables 7 and 8 as well as Appendix Tables 9 and 10).

Higher rents due to retrofitting eventually would reach market levels for many residential hotel units under rent control. The exception would be Alternative 1. In that alternative, retrofitting costs are relatively low so that rent increases would equal retrofitting costs before market rents are reached in many cases. Therefore rents for most residential hotel units would remain below market levels. Under Alternatives 2 and 3, however, because of the relatively higher retrofitting costs, rents for most residential hotel units eventually would reach market levels. Most tenants who remained in their residential hotel units would lose the rent advantages of rent control for a period of time because of the retrofitting requirements.

Although retrofitting costs would be higher under Alternative 3 than Alternative 2, rent increases for existing tenants who remain in their units eventually would be the same under both alternatives for almost all residential hotel units. This is explained by the relatively small differential between occupied and market rents for most of these units (because of relatively frequent turnover of tenants) that limits the potential for increasing rents. Under Alternative 2, rent increases up to market levels would not cover retrofitting costs in most cases. Those same market limits would apply under Alternative 3 such that there could be no further rent increases associated with the higher costs of Alternative 3.

Given the limits on rent increases for residential hotel units, most tenants who remained in their units would experience relatively few annual increases in rents before the cost limit or market rent limit on additional annual increases is reached.* For residential

*Rent increases are described in terms of the number of annual increases because it is not possible to generalize as to the cumulative total increase in percentage terms. The following illustrates what is meant by the number of annual increases, in this case assuming two annual increases and assuming rent of $300 per month in the first year after retrofitting. The rent increase for retrofitting in the first year could be $30 (since the increase is limited to 10% of the rent). Total rent in the first year would be $330. In the second year, rent, excluding the increase for retrofitting, could be $312 if a 4% cost-of-living increase is allowed. In year 2, the additional increase for retrofitting could be $31.20 (10% of $312), and the total amount collected for retrofitting that year could be $61.20 ($30.00 annual income for year 1 plus $31.20 annual increase for year 2). The total rent in year 2 would be $373.20 ($312 + $31.20 + $30). If that total rent equaled or exceeded market rent or if the total increase equaled or exceeded amortized retrofitting costs (so that there could be no additional annual increases in later years), the number of annual increases in rent as a result of retrofitting would be two.

hotels, the number of annual increases would vary from one to five with most tenants experiencing two annual increases under all alternatives.

There would be a broader range of situations for existing tenants of apartment units in UMBs under rent control. Average tenure is longer for apartments than for residential hotels, resulting in a larger differential between occupied and market rents. For apartments, this differential varies by neighborhood area, including some areas with large differentials because of low turnover (Chinatown, in particular). There also is more variation in apartment rents than there is for residential hotel rents. As a result, the choice of a retrofitting alternative would result in greater increases in apartment rents than in rents for residential hotel units.

For apartment units under Alternative 1, almost all rent increases due to retrofitting would be a function of retrofitting costs (because the cost limit on additional increases would be reached in nearly all cases). Total rents would be higher as a result of retrofitting but would remain below market levels. Thus, during the period of additional rent for retrofitting improvements under Alternative 1, apartment tenants who remained in their units would retain some rent advantage as a result of rent control. Even with the higher retrofitting costs under Alternative 2, rents for most of the apartments would remain below market levels. However, rents for some of the apartments would reach market levels. Under Alternative 3, the higher costs of retrofitting would result in rents that would be at market levels for more of the apartments. However, rents for most of the apartments would still remain below market levels. Units with rents remaining below market levels include many apartments occupied by tenants that have lived there for relatively long periods of time (so that the differentials between occupied and market rents would be large).

The number of annual increases in rents would vary among Alternatives for most apartment units. Because the variety of factors (turnover, rents, retrofitting costs) determining rent increases vary, there would be a range for the number of annual increases under each

Alternative (ranging from one to eight annual increases). Due mainly to differences in costs, tenants would experience the smallest number of annual increases in rents under Alternative 1 and the largest number of annual increases under Alternative 3. For Alternative 1, the range would cluster around two annual rent increases. For Alternative 2, it would cluster around three annual increases. For Alternative 3, the range would cluster around four annual increases. Under Alternative 3, not all of the apartments would experience more annual increases in rents compared to Alternative 2, however. Those with rents that reached market levels under Alternative 2 would not experience any additional annual increases in rents with the higher costs of Alternative 3.

Higher rents because of retrofitting would have impacts on the affected tenants. Higher rents would mean more resources spent for housing and fewer resources available for other expenditures. Higher rents could result in lesser housing services to the extent that tenants were unwilling or unable to pay the higher rents. In those situations, the occupancy of units could increase (for example, a roommate could be added), or tenants could move to a lower-cost unit that might be smaller, have fewer amenities, or be in a less desirable location. Those types of effects would be most likely for tenants that had lived in their units for a long time such that the rents they were paying were substantially below market rents for a unit of that type.

It is likely that the potentially most severe impacts would be avoided by provisions of the Rent Board Rules and Regulations for exempting tenants from rent increases for capital improvements, on the basis of hardship. The provision could potentially exempt the disabled, elderly, and others on fixed incomes or with limited ability to increase incomes, when the higher rents because of retrofitting would represent too large a share of income. The general characteristics of the population of UMBs as described in Chapter II indicates that UMBs house many elderly people, low-income single people and families, and others with special needs. Potentially, many of these tenants could be exempt from rent increases for retrofitting.

Implications for Residential Building Owners

For residential UMBs not covered by the Residential Rent Stabilization Ordinance, the costs of retrofitting requirements would be borne by the owners of those buildings under all alternatives. The owner cannot expect to generate more rental income from the building solely as a result of the retrofitting work. Without retrofitting, rents would reflect what the market will bear for a particular use and location of the building. For residential UMBs covered under the Residential Rent Stabilization Ordinance, owners who perform the retrofitting would bear the majority of the costs. However, some of the costs would be borne by existing tenants who remained in their buildings after retrofitting (because rents for rent-controlled units would be below market levels). For UMBs covered by the Residential Rent Stabilization Ordinance, the share of retrofitting costs borne by owners would vary among alternatives. Building owners would bear a larger amount and a larger share of retrofitting costs under Alternative 2 compared to Alternative 1 and the largest amount and share of costs under Alternative 3. Although the amount of costs borne by tenants would increase with the Alternatives, the share of total retrofitting costs covered by the tenants would decline as the requirements and costs of retrofitting increase.

Under Alternative 3 in some limited sub-markets, the overall level of market rents could increase as a result of losses to the housing stock due to retrofitting requirements. In those situations, all tenants would bear some of the costs of retrofitting (not just those who would remain in rent-controlled UMBs) and owners would bear the rest of the costs. The effects of retrofitting in terms of higher market rents for housing in some sub-markets would extend to owners of all buildings with housing serving the affected sub-markets, not just to owners of UMBs. Owners of non-UMB properties serving those sub-markets would benefit from the requirements (in terms of higher rents) without having to pay the costs of retrofitting.

FISCAL IMPLICATIONS

Retrofitting requirements also could have implications for the City's fiscal situation. The effects of retrofitting requirements on building values and building outcomes could affect property tax revenues to the City. The rest of this section describes the shorter- and longer-term effects on property tax revenues that potentially could occur. Program costs associated with mitigating adverse impacts of retrofitting requirements also would have fiscal implications if those costs were supported by public revenues. At this time, there are no specific proposals of that type.

Shorter-Term Property Tax Revenue Implications of Lower UMB Values Due to Retrofitting Requirements

Once retrofitting requirements were adopted, the market values of UMB's would be lowered to account for the costs of the required retrofitting work. (The owner burden ratios in Chapter IV identify potential percentage reductions in market values due to retrofitting requirements.) Until retrofitting requirements were satisfied, the values of UMB's would remain lower than the market values they would have in the base case (without retrofitting requirements). Lower market values could mean lower property tax revenues until the requirements were satisfied, compared to property tax revenues under the base case.

The extent to which property tax revenues would be lower would depend on how the lower market values compared to assessed values for UMB's when re-assessment to account for retrofitting requirements was considered. Since Proposition 13, assessed values of properties are often lower than market values because re-assessment occurs only when property is sold. Without a sale, assessed values of existing properties increase at two percent per year, although market values may increase at a faster rate. To account for the effect of retrofitting requirements, UMB owners could request that their property be re-assessed. However, assessed values would only be reduced if the lower market value to account for retrofitting was below existing assessed value. Owners would be responsible for requesting a re-assessment because of retrofitting, so the extent of the potential fiscal

effect would depend on their initiatives. Because of the rules governing increases in assessed values under Proposition 13, some owners would not have much incentive to seek re-assessment if they had held their property for many years and thus enjoyed a low assessed value before accounting for retrofitting.

Sales prices for UMBs sold prior to retrofitting would be discounted to reflect the cost of the required retrofitting work. The new assessed value upon sale would be lower as a result of the retrofitting requirements than it would be if the property was sold in the base case without such requirements. The resultant property tax revenues would be lower as well. There could be some offsetting effects from higher assessed values and property tax revenues from non-UMB properties sold for higher market values because of higher rents and/or occupancies to accommodate tenants relocated from UMBs undergoing retrofitting. This latter effect could occur during the enforcement period for retrofitting requirements.

Based on the above, it is probable that assessed values and resultant property tax revenues from some UMB properties would be lower as a result of retrofitting requirements. However, the overall extent of effects on property tax revenues would be less than effects on market values of UMBs. Among alternatives, Alternative 3 would likely have the most effects on property tax revenues because retrofitting costs would be the highest under that alternative. Alternative 1 would have the least effects. Alternative 2 would fall between those alternatives, resulting in effects more similar to Alternative 3 than to Alternative 1.

Property Tax Revenue Implications of Building Outcomes Affected By Retrofitting

Property tax revenues also could be affected as a result of the different building outcomes expected because of retrofitting requirements. (The impacts of the alternatives on building outcomes are discussed earlier in this chapter.) Those effects would occur once the retrofitting work was completed or once new construction, conversion, or demolition occurred as an alternative to retrofitting. The effects on property tax revenues would depend on the building outcome.

In situations where retrofitting requirements would result in UMBs demolished for new construction or converted to other uses sooner than in the base case (without retrofitting requirements), the UMB property would be re-assessed sooner, and resultant property tax revenues would be higher than in the base case, for a period of time. There also would be situations in which retrofitting requirements would result in outcomes that would not otherwise occur in the base case (such as the conversion of some mixed hotels with residential and tourist units to solely tourist hotels). In those cases, property tax revenues would be permanently higher than in the base case. New construction or a change in use triggers re-assessment of the property to reflect a new building (in the case of new construction) or major extension of the economic life of the existing building that increases the income-earning potential of the property (in the case of changes in use). It is possible that extensive upgrading to attract higher-rent-paying tenants as a result of retrofitting also could trigger re-assessment and could result in higher property tax revenues.

In situations where retrofitting requirements would result in the demolition of UMBs at risk because retrofitting would not be feasible, property tax revenues would be lower than in the base case, at least for some time into the future. The assessed values of the demolished buildings would be removed from the tax rolls. Assessed value would be added for paving for parking use or other minor improvements (assuming that new construction would not be viable for a while into the future). The result would likely be lower assessed values for improvements compared to the base case where the existing building is assumed to remain. (The exception could be situations with old, outmoded or dilapidated existing buildings that had retained only minimal assessed value, particularly if the site was used for parking after demolition.) It is reasonable to assume that the assessed values of the land would not be affected.

For buildings that are retrofit according to the requirements (without a change in use or major upgrading to attract higher-rent-paying tenants), assessed values and property tax revenues once the work is completed would likely be the same as in the base case. Assessed values would return to prior levels in situations where they were temporarily

reduced to reflect lower building values because of retrofitting costs. Assessed values are unlikely to be affected in the rest of the situations. By itself, retrofitting work to satisfy the requirements would probably not trigger re-assessment as would a change in use or extensive upgrading to attract higher-rent-paying uses.

Among alternatives, the implications for property tax revenues would be a function of effects on building outcomes as described earlier in this chapter. Compared to the base case scenario, property tax revenues would be most different under Alternative 3 because effects on building outcomes would be greatest under that alternative. There also would be effects on property tax revenues under Alternative 2, although they would be less than under Alternative 3. There would be relatively little difference in property tax revenues under Alternative 1. Generally, for all alternatives, more of the impacts of retrofitting in terms of **higher** property tax revenues would be associated with commercial/industrial UMBs and more of the impacts in terms of **lower** property tax revenues would be associated with residential UMBs.

Longer-Term Revenue Implications of Effects of Retrofitting on the Supply of Space

For real estate sub-markets where higher rents would be expected over the longer term as a result of effects of retrofitting on the supply of space, market values for affected properties would be higher as well. As such properties were sold over time, they would be re-assessed at higher values than if they were sold at lower market values under the base case. As this occurs, property tax revenues would be higher as well.

As described earlier in this chapter, effects of this type would primarily occur under Alternative 3, in the cases of lower-cost, older, relatively unimproved commercial/industrial space in certain locations and of housing in relatively higher-rent locations where UMBs are concentrated. The effects would extend to all properties serving the affected sub-markets, not just to the UMB properties.

VI. CONSTRUCTION PERIOD IMPLICATIONS

The socioeconomic impacts of the retrofitting alternatives include impacts directly related to the work required to complete seismic strengthening. This chapter presents two aspects of those impacts associated with construction activity. The first describes what the actual construction work associated with retrofitting projects would mean to occupants of UMBs, while the work was underway. The second describes, from a citywide perspective, the range of potential economic benefits associated with the retrofitting requirements. A section at the end of the chapter describes the fiscal implications for San Francisco of the construction period effects of the retrofitting requirements.

To develop estimates for comparing the alternatives in terms of disruption and displacement of building occupants for retrofitting or in terms of construction jobs and construction spending, the assumption for this part of the analysis is that the retrofitting work would be done for all buildings. The numbers presented here are thus independent of the longer-term analysis presented in Chapters IV and V assessing the likelihood that UMBs would not be retrofit and eventually would be demolished as a result of the requirements. The last part of Chapter V identifies the impacts for building occupants of those scenarios.

HARDSHIPS FOR BUILDING OCCUPANTS

Types of Disruption

The disruption to occupants of unreinforced masonry buildings during the retrofitting work depends on the structural characteristics of the building and the nature of the strengthening required. Section 3 of the Rutherford & Chekene report, Seismic Retrofitting Alternatives for San Francisco's Unreinforced Masonry Buildings, describes the characteristics of construction and variations depending on building use for each seismic

retrofitting alternative. (R&C, 1990, pp. 3-74 through 3-85) The potential types of disruption include:

- complete relocation from the building for the duration of the retrofitting project;
- limited use of space within the building while the work proceeds in phases;
- inconvenience and complications from living or working with noise, debris, drafts, and dust;
- temporary interruption of utility mains resulting in loss of power;
- conflicts with construction-related traffic and materials storage; and
- security problems.

Generally, physical disruption would be greatest in smaller buildings where there is limited space to separate occupants from construction activities.

Overall Comparison of Alternatives

All occupants of UMBs would experience some form of disruption or inconvenience during the course of the retrofitting work on their building, under all alternatives. The type of disruption and the length of time involved would depend on the physical characteristics of the building; they also would vary significantly by alternative.

Retrofitting activity under Alternative 1 would pose the least hardship for building occupants. In some cases, only a limited area of the building would be disturbed; while a few occupants would have to rearrange their living or working situation for a few days (moving furniture, closing off certain areas), others would be generally unaware of the construction. Other retrofit projects under Alternative 1 would be somewhat more disruptive, disturbing more occupants with construction traffic, noise, and dust. In all but a few instances (generally smaller buildings), the amount of building area required to accommodate the retrofitting work would not be large enough to signal the need for tenants to move out of the building.

The disruption associated with retrofitting projects would be substantially greater under Alternative 2. There would be few if any cases in which occupants would be relatively unaware of the construction activity. All occupants would be bothered by dust, noise, and construction traffic, to greater or lesser degrees at some time during the retrofitting. Small buildings would have to be vacated for retrofitting projects under Alternative 2. In buildings with multiple stories and small floor-plates, some occupants could remain in the building, but substantial areas would have to be reserved for construction work. Because the project would move in phases through the building, tenants would need to restrict their living quarters or business operating areas for varying lengths of time during the course of the retrofitting project. In some instances, whole wings or floors would have to be vacated.

Retrofitting projects under Alternative 3 would be extremely disruptive to building occupants. More buildings would require construction involving steel beams and foundation work. In many cases, the time to complete the work would be substantially longer than under Alternative 2, so occupants remaining in the building would be subject to construction noise, dust, and traffic for longer periods. Under Alternative 3, there would be more cases of buildings vacated for retrofitting. For buildings not entirely vacated, more space would be required to accommodate construction activity at any one time, compared to Alternative 2. Because more space would be required, the options for those tenants deciding to remain in the building during the retrofitting project would be more limited. While some occupants would move out of their space to other space in the building, in phases, more would have to move out entirely, for some portion of the retrofitting period.

Displacement from Buildings Vacated for Retrofitting

Characteristics of UMBs Vacated for Retrofitting

Combining information about building characteristics with the description of the construction characteristics for each alternative leads to conclusions about the ability to maintain occupancy when some types of strengthening activities are required. In buildings with small floor areas, retrofitting activity and required staging areas for materials under Alternatives 2 and 3 would be extremely disruptive. The nature of the work and the limited work area available would, in most cases, necessitate vacating the building for the duration of the project. Under Alternative 1, retrofitting work would be confined to the perimeter of the building, for the most part; while occupants might be displaced temporarily from certain areas, the work generally would not be disruptive enough to warrant vacating the building. Instead, tenants might be required to limit the amount of space they used by closing off certain areas and consolidating their activity in other areas, or move to empty space somewhere else in the building for a short period of time.

Under Alternative 2, buildings in prototype groups A, E, G, and K (small, one - three story industrial, office/commercial, and residential UMBs) are assumed, for purposes of impact assessment, to be vacated for retrofitting. Under Alternative 3, those buildings plus buildings in prototype groups I, L, and M (large, two and three story residential UMBs and small, four and more story office/commercial and residential UMBs) are assumed to be vacated for retrofitting. While some occupants of other types of buildings also might be required to relocate during some or all of the retrofitting period, those situations do not present the potential for constant, serious disruption that would be the case with smaller buildings. Table 34 shows what the assumptions mean in terms of amounts of building space, numbers of businesses, and number of residential units.

It is unlikely that any buildings would be required to be vacated for retrofitting under Alternative 1. Under Alternative 2, one-third of the UMBs would be vacated for retro-

TABLE 34

CHARACTERISTICS OF UMBs VACATED FOR RETROFITTING

	Alternative 1	Alternative 2	Alternative 3
Number of Buildings	0	622	977
Percent of All UMBs	0%	32%	50%
Amount of Space	NA	3,028,343	7,502,787
Percent of All Space in UMBs		9%	22%
Number of Businesses	NA	998	1,683
Percent of All Businesses in UMBs		22%	37%
Number of Residential Units	NA	1,272	7,526
Percent of All Residential Units in UMBs		6%	35%

NOTE: According to the criteria developed for this analysis, no UMBs would be required to be completely vacated for the more limited retrofitting projects associated with Alternative 1. Table 13 in Chapter III summarizes, by building prototype, the assumptions regarding buildings to be vacated for retrofitting.

SOURCE: Recht Hausrath & Associates, based on information provided by Rutherford & Chekene

fitting; half would be vacated under Alternative 3. Because those vacated would be the smaller UMBs, they represent substantially smaller percentages of total building space in UMBs. Alternative 3 would require vacating more than twice as much building space as would Alternative 2.

Under Alternative 2, almost 1,000 businesses (about 20% of the total) would be required to move out for the duration of the retrofitting period; about 1,700 would be required to move out under Alternative 3. Under Alternative 3, almost 40% of all businesses in UMBs would have to move for the duration. Many of those would be businesses located in residential buildings.

The UMBs completely vacated for retrofitting under Alternative 2 contain about 1,300 residential units (about 6% of the total housing stock in UMBs). The nature of the strengthening activities associated with Alternative 3 would be particularly disruptive for residential tenants; the additional buildings that would be vacated under that alternative are primarily residential UMBs. Over 7,000 residential units would be vacated, one-third of the total housing stock in UMBs. Vacating those residential buildings also would mean that businesses located on the ground floor would have to move out, as noted above. Almost half of the commercial space in residential UMBs is in buildings that would be vacated during the retrofitting period under Alternative 3.

Displacement from unreinforced masonry buildings while retrofitting work is on-going would not occur all at once. All UMBs would not be retrofit at the same time, so all tenants would not have to move out at the same time and thus would not be looking for temporary housing or business locations at the same time. The number of buildings vacated and the number of businesses and households displaced at any one time would depend on the time period for compliance established as part of the seismic retrofitting program (5 years, 10 years, 15 years, or 30 years). The shorter the period, the more concentrated the impacts and the more limited the options for those so displaced. Particularly for households, a short compliance period under Alternative 3 would result in a large number of tenants looking for temporary replacement housing. Because of the constrained housing supply in San Francisco, particularly in those sub-markets in which rents are relatively low, it is unlikely there would be enough options to accommodate those temporarily displaced during retrofitting.

Duration of Displacement from Buildings Vacated for Retrofitting

Retrofitting projects proceed more efficiently when buildings are vacated. Therefore, the time during which occupants would need to find alternative business or living quarters would be relatively short. Table 35 presents estimates of the duration of retrofitting projects for all prototypes and shows the duration for buildings without occupants for those

TABLE 35

DURATION OF RETROFITTING PROJECTS BY PROTOTYPE
BY ALTERNATIVE (WEEKS)

Prototype	Alternative 1	Alternative 2	Alternative 3
A - small, one story	5	4 (v)	4 (v)
B - large, one story	6	9	12
C - irregular, residential	18.5	38	45
D - irregular, non-residential	16.5	34	40.5
E - small, industrial	7	6 (v)	8 (v)
F - large, industrial	8	12	15
G - small, 2-3 story, office/commercial	8	6 (v)	8 (v)
H - large, 2-3 story, office-commercial	10	15	20
I - small, 4+ story, office/commercial	8	15	12 (v)
J - large, 4+ story, office/commercial	14	28	48
K - small, 2-3 story, residential	9	6 (v)	7 (v)
L - large, 2-3 story, residential	10	14	8 (v)
M - small, 4+ story, residential	10	22	12 (v)
N - large, 4+ story, residential	15	36	60
O - assembly	13	19	28

(v) = Vacant. Duration is for work on building without occupants.

NOTE: The duration estimates should be interpreted as the minimum time required for the actual construction work performed efficiently by skilled workers who are well supervised. The duration estimates do not account for delays in timely inspections or material delivery. They also do not account for additional work that may be simultaneously undertaken or for the time involved with project planning, design, testing building materials, or obtaining permits. The duration estimates do not account for time premiums for work on historically or architecturally significant buildings. Depending on the prototype and the alternative those premiums would range from 2% to 30% more time.

SOURCE: Rutherford & Chekene

prototypes assumed to be vacated for retrofitting (indicated with a "v"). Under Alternative 2, retrofitting empty buildings would take, at a minimum, four to six weeks (assuming timely inspections and materials delivery). Under Alternative 3, retrofitting vacant buildings would last from four to 12 weeks, at a minimum. In some projects, additional work to protect the building fabric for architecturally or historically significant buildings or to undertake more extensive remodelling would add to the time estimate.

Limitations on Occupancy of the Rest of the UMBs during Retrofitting

Under Alternative 2 about two-thirds of the UMBs would not have to be vacated completely for retrofitting. Under Alternative 3, about half would not have to be vacated. No UMBs would have to be vacated for retrofitting under Alternative 1. Nevertheless, use of those UMBs would be limited during the retrofitting projects. Space would be needed to accommodate construction work and construction materials. Retrofitting projects moving in phases through a building eventually would disrupt most space in that building. As a result, **all** tenants in buildings that were not vacated for retrofitting would be disrupted or displaced in some degree at some time during retrofitting.

To accommodate retrofitting projects, tenants would have to make adjustments. Some tenants might move out of the building while the retrofitting work made full use of their space impossible. Others might remain in the building, but would have to move to another part of the building temporarily or substantially limit the use of their space for a while. Estimates of the average amount of building space that could not be occupied during the retrofitting project, for each building type for each alternative, were developed using the Rutherford & Chekene engineering analysis. Smaller prototypes would require proportionally more space to accommodate the construction work and materials, and Alternatives 2 and 3 would require space to be reserved for more extensive strengthening activities and greater amounts of bulkier building materials.

Table 36 presents information about the UMBs that could remain occupied, allowing for displacement from certain areas to accommodate construction activities and materials. For total space in those buildings, for space in the commercial/industrial UMBs that would not be vacated for retrofitting, and for residential units in the UMBs that would not be vacated, the percentages in the table are indicators of the extent to which normal use of the building would be limited. Given the large variation across building prototypes and uses, the percentages ("percent not occupiable" in the table) do not represent conditions in any one average building. They are best interpreted as relative measures across alternatives of the magnitude of disruption or displacement in UMBs not vacated completely for retrofitting.

Table 36 indicates relatively small impacts on the use of space in UMBs during retrofitting under Alternative 1. On average, across all UMBs not vacated, retrofitting would disrupt about 10% of building space at a time. Because of the wide variation among building prototypes, the overall pattern for Alternative 1 is somewhat misleading, however. Depending on prototype and use, the average percent of a building that could not be occupied during an Alternative 1 retrofitting project would range from none for industrial buildings to 40% for small-footprint, one-story commercial and residential buildings. The overall percentage is low because, in larger buildings, relatively small percentages of the space (3% - 5%) could not be occupied.

Under Alternative 2, for those two-thirds of the UMBs not vacated for retrofitting, on average, about one-quarter of each building would not be occupiable at any particular time. The range across prototypes is not as large as it is for Alternative 1. At the low end of the range, on average, about 15% of the space in large-area commercial or industrial buildings would be off-limits during retrofitting. In small-footprint commercial and residential buildings and some larger residential buildings, up to 40% of building space would be needed for construction activity.

TABLE 36

LIMITATIONS ON THE USE OF UMBs NOT VACATED FOR RETROFITTING: BY ALTERNATIVE

	Alternative 1	Alternative 2	Alternative 3
ALL UMBs:			
Number of UMBs Not Vacated	1,959	1,337	982
Percent of All UMBs	100%	68%	50%
Percent of Building Not Occupiable (Average across UMBs Not Vacated)	10%	25%	43%
Total Space in UMBs Not Vacated for Retrofitting	33,435,555	30,407,212	25,932,768
Percent of That Space Not Occupiable	6%	22%	42%
COMMERCIAL/INDUSTRIAL UMBs:			
Total Space in Commercial/Industrial UMBs Not Vacated for Retrofitting	20,122,935	17,973,985	17,123,445
Percent of That Space Not Occupiable	5%	19%	38%
RESIDENTIAL UMBs:			
Total Housing Units in UMBs Not Vacated for Retrofitting	21,755	20,483	14,229
Percent of Those Units Not Occupiable	8%	26%	50%

NOTE: "Percent not occupiable" accounts for the need to accommodate construction activities while the retrofitting work would be underway. The percentages are indicators of the extent to which normal use of the building would be limited by construction work. They are best interpreted as relative measures across alternatives of the magnitude of disruption or displacement in UMBs not vacated for retrofitting.

SOURCE: Recht Hausrath & Associates, based on information provided by Rutherford & Chekene

For those UMBs that could remain partly occupied under Alternative 3 (only 50% of all UMBs), there would be substantial limitations on the use of space and residential units, although the buildings would not have to be vacated entirely. On average, retrofitting activities under Alternative 3 would disrupt about 40% of a building at a time. At the

most, for residential UMBs and some commercial UMBs, half of the building could not be occupied. After work on that half was completed, work would move to the other half of the building. The limitations on use would be less extensive for the largest commercial and industrial UMBs where retrofitting work would disrupt about one-third of the building at a time.

By contrast to occupants of UMBs that would be vacated for retrofitting, occupants of the rest of the UMBs would not necessarily be displaced for the full duration of the retrofitting project. Situations would vary depending on the characteristics of the building and the preferences of the building owner and building tenants. For single-tenant or owner-occupied buildings, disruption and limited use of building space would affect different parts of the business or household at different times for the entire work period. In cases of multi-tenant buildings, particularly larger UMBs, owners anticipating a major retrofitting project might not re-lease space vacated in the normal course of tenant turnover, using that accrued vacant space to accommodate some remaining tenants who would have to move out of their own space temporarily. In other cases, some tenants might relocate out of the building and other tenants of the same building might move to usable spaces within the building. In many cases, it would be possible for tenants to close off certain parts of their space while the work was being done there and consolidate their business operations or living quarters in space that would not be needed to accommodate the construction work. Some projects would displace all tenants for about equal amounts of time, in phases, but not any tenants for the entire construction period. Some of the less extensive projects more likely under Alternative 1 would only displace tenants living or working in certain parts of the building.

Table 35 presented the estimates of the average duration of retrofitting projects by building prototype and by alternative. For the reasons noted above, except in the case of buildings vacated for retrofitting, the duration of displacement for any particular tenant would probably be less than the total time needed to complete the retrofitting project.

Examples from each alternative illustrate that conclusion. Under Alternative 1, it would take eight to nine weeks to retrofit completely buildings of prototypes G and K (small area, two- and three-story commercial and residential buildings). While those types of UMBs would not have to be vacated, retrofitting would mean limitations on the use of space and could require some displacement; at any time during the project, 20% - 25% of the space could not be occupied. If the nature of the strengthening activities required that displacement occur throughout the building, then about one-quarter of the tenants would be displaced at any one time. Thus, over the course of the eight-to-nine week retrofitting project, any one tenant would be displaced for about two weeks. After that time, the work would have moved on from their space, and another tenant would be temporarily displaced. Under Alternative 2, retrofitting UMBs of prototypes C and N (large residential buildings) would take 36 - 38 weeks, at a minimum (about nine months). During the course of the work, about 20% of the building could not be occupied. Therefore, if the work proceeded in phases, then any individual tenant might only be displaced for about seven to eight weeks, on average. Similarly, under Alternative 3, occupants of buildings that would take the longest to retrofit (prototypes C, J, and N), would not all be displaced for ten months to over a year. In those buildings, about half the space could not be occupied while the construction work was underway. Consequently, half the tenants would be displaced for the first half of the project (five to seven months, still a long time) and the balance of the tenants would be displaced for the second half of the project.

As in the case of buildings vacated for retrofitting, the retrofitting work on the UMBs that could remain partly occupied would be spread over a period of years. Consequently, the disruption and potential displacement of tenants of those buildings would not occur all at once. Timing would depend on the compliance period selected as part of the seismic retrofit program and on the decisions of building owners.

Under Alternative 1, particularly, since it is unlikely that UMBs would be vacated for retrofitting and other disruption and displacement impacts would be small in total, a relatively short compliance period that concentrated the impacts in a short time frame

probably would not cause problems in terms of the scarcity of temporary housing or business space for tenants displaced. Under Alternatives 2 and 3, potentially quite large number of tenants would relocate temporarily from UMBs not vacated completely for retrofitting. That would add to the displacement and the demand for temporary space or housing. The time-period for compliance and the scheduling of retrofitting projects would thus be more important under those two alternatives.

Impacts of Construction Period Disruption/Displacement for Building Occupants

There are many types of impacts associated with the types and duration of disruption/displacement identified above. It is not possible to quantify the number of businesses or residents that would be subject to each type of impact. It is possible to describe the impacts and identify the types of businesses or residents likely to have the most difficulty during the retrofitting construction period. The balance of this section contains that characterization of the severity of construction period impacts for building occupants. Business tenants are discussed first, by generalized business type; tolerance for the various disruptive impacts for occupants remaining in the building during retrofitting is closely linked to the nature of the business in the UMB, and the hardship imposed by temporary relocation depends on the importance of location to the business as well as on the availability and cost of alternative space. For residents, consideration of the characteristics of the population living in UMBs provides a basis for conclusions about what the retrofitting requirements would mean in terms of cost and physical hardship.

The retrofitting alternatives are not referenced **per se** in the following discussion. The types of disruption and the relative magnitudes of disruption associated with each alternative were discussed above. Alternative 3 would be worst in terms of the duration of disruption and the potential for displacement while buildings were vacated for retrofitting. Under Alternative 1, the retrofitting work would not be very disruptive, and it is unlikely there would be much displacement. Alternative 2 would fall between those ends of the spectrum, probably with impacts closer to Alternative 3 than to Alternative 1.

The degree of hardship for building occupants associated with each alternative would follow that same relative ranking.

Implications for Businesses

Hardships for businesses would result from retrofitting construction in the form of reduced revenues and/or additional costs. Revenues could be reduced to the extent that businesses close temporarily, lose use of a portion of their space for a time, or lose productive time because of the retrofitting. Loss of productive time would include situations in which substantial time would be required for relocation and/or construction-related matters, as well as situations in which noise, dust, or other disruptions would limit normal operations. Additional costs would be incurred primarily by businesses that relocate all or a portion of their operations during the retrofitting. The costs could include moving expenses and, possibly, a cost differential in rent as well as the costs of additional advertising and/or mailings to clients and customers.

The significance of hardships for businesses not only depends on the type of business (as discussed below), but also on the health and financial resources of the individual establishment (whether small or large; new or established; successful or more marginal). Construction-related hardships would mean less income to owners in most cases. For some small, marginal operations, the impacts could mean that owners go out of business as a result of construction-related impacts.

Impacts on business operations could have implications for employees as well. Reduced business operations and/or reduced income could mean reduced employment and associated wages and salaries. Business disruptions and cut-backs could include reduced staffing, temporary lay-offs, and/or forced vacations. Business closures could mean loss of employment.

Retail Businesses. Disruption from construction activity and the potential requirement to move out of the building for some or all of the retrofitting project would be most difficult to bear for retail shops and stores, eating and drinking establishments, and personal services businesses. The retrofitting projects could compromise key elements of their ability to do business.

Retail stores and eating and drinking places are dependent on visibility to foot traffic and maintaining a pleasant environment. On-site disruption from construction activity would mean reduced visibility for merchandise or signs. The dusty aspects of a retrofitting project also could damage merchandise or make it less appealing to customers. The dust and noise would be particularly burdensome for businesses selling or preparing food and for those offering a relaxing, comfortable dining experience. Since many of the businesses in this group are open during the day and night, it would be difficult to schedule the retrofitting work to avoid conflicts with business operations.

Although the on-site disruption of retrofitting activities would cause serious problems for retail businesses, most would probably choose to remain at their current location and endure the situation, to the extent possible, in spite of having to scale-back operations, rather than to relocate to other space. For those with no choice because the retrofitting project would pose constant and serious disruption, relocation could be very difficult as described below.

The length of time required for relocation would make a difference. If the business were only required to be closed for two to four weeks, the burden of lost sales would be relatively small and the business owner could decide to use those weeks as vacation. If the business were required to be closed for a longer period of time, the owner would be forced to seek an alternative location. For owners who had to relocate, the availability of suitable space in the same general vicinity would be a key requirement.

Location is particularly important to retail businesses. Depending on the business, location can be important in terms of proximity to customers (residents, visitors, workers), accessibility (via auto/proximity to parking, via public transit), and being part of an established retail area (such as Union Square or a particular neighborhood commercial district). Local-serving businesses are particularly dependent on location because proximity and convenience are a large part of what they are selling. Especially if the establishments' goods and services are not particularly unique (e.g., stores selling grocery items or liquors, video or record shops, sandwich shops and delis, etc.), businesses that cannot find suitable nearby locations could lose customers who find other, more convenient alternatives. Businesses serving a larger market area may have more flexibility in location; although for them, a location in an established retail area could remain important. Depending on the availability of alternative locations, more specialized businesses with an established, loyal clientele may be better able to relocate than newer businesses and those in more competitive lines of businesses.

The nature and suitability of alternative facilities also is important to some retail businesses. Eating and drinking places as well as some retail stores and shops depend on the ambiance of the surroundings that have been created by extensive interior improvements to their space. In addition, there are eating and drinking places and personal service establishments that require specialized facilities and equipment (kitchens, hair dryers and sinks, dry cleaning racks and equipment, etc.). Thus, for some retail businesses, it may not be possible to operate in alternative space without substantial improvements. As a result, temporary relocations may not be possible (so that owners would close for a time rather than move) or may require permanent relocations to justify the costs of improvements.

In some situations, retail business owners would be able to find suitable vacant space in the same general vicinity and would be able to re-open with minimal loss of sales and customers. While the availability of space would not be a problem, those businesses might

end up paying more for rent than they otherwise would have, at least for a period of time.

Hotels. Similar to retail establishments, tourist hotel operations would be extremely sensitive to the disruption of retrofitting work. Essentially, hotels sell an environment, and potential hotel guests have a range of options from which to choose; it would be difficult to attract and retain customers during a noisy and dusty seismic retrofitting project. A hotel operator would not have the option of relocating during retrofit. Therefore, depending on the extent of the work, most of the unreinforced masonry hotels would be likely to cease operations for the duration of the retrofitting project. If the work were scheduled for the off-season, the financial impact from lost bookings would be minimized because vacancies would normally be high during those winter months.

Office Businesses. The nature of office businesses generally means that they could tolerate retrofitting work more easily than retail or hotel businesses. By contrast to those establishments, office businesses are not as dependent on proximity and accessibility to customers or on the quality of the environment in which they operate. Management and administrative functions, communications, record-keeping, and creative work could be maintained under the conditions of a retrofitting project, while sales and customer service might not be. By contrast to retail establishments that would risk losing business as a result of the disruption of retrofitting, office businesses would primarily be concerned that employees be allowed to continue to work. Therefore, for some period of time, they would consolidate operations and move people from one place to another, while the work moved through their space. While there might be less productivity for a time, work could continue. In fact, regular clients of office businesses might not even be aware that the retrofitting work was going on, unless they visited the building.

Sensitive office machines might be difficult to protect during retrofitting. Some offices might have a lot of sensitive equipment, in which case the retrofitting project would be more difficult to manage.

Some office businesses would have to relocate for the more extensive retrofitting projects. There are more space options for office tenants (generally higher vacancy rates and less dependent on location) than there are for retail tenants, so it would not be as difficult for office businesses to find suitable alternative space as it would be for retail businesses. Some former office tenants of UMBs would probably have to pay higher rents for space, however. Some businesses, forced to move out for a long period of time, might decide to make the move permanent.

Industrial Businesses. Industrial, repair, warehousing, and distribution businesses would be the most tolerant of retrofitting activities. Since those types of businesses often generate their own noise and dust, the additional disruption associated with construction work on the building would not be as noticeable. In many cases, it would not detract significantly from the normal conditions of work in those facilities. Exceptions would be types of activities for which dust could be a problem, i.e., food preparation, storage, and distribution; photographic or other processes involving sensitive materials and equipment. Businesses involving those types of activities might have to relocate for the duration of the retrofitting project or close if relocation were not possible because of equipment or machinery.

Industrial businesses also often have considerable flexibility in the use of space. Many in older facilities in San Francisco (such as UMBs), occupy more space than they actively use. The underutilized space could make it easier to close off certain areas to accommodate the retrofitting project. On the other hand, operations that involved large, relatively fixed pieces of equipment could face serious problems continuing to work during a more extensive retrofitting project if construction activity impaired access to that equipment.

Garages. The types of businesses located in garages (auto and other repair establishments, auto sales, supply, and service establishments) generally would not be very sensitive to the disruption of retrofitting activities, similar to many industrial and warehouse businesses. One- and two-story garage-type structures (prototypes A and E), however, fit the

characteristics of UMBs where there would be significant advantages to retrofitting a vacant building, under Alternatives 2 and 3. Because they are relatively small buildings, the retrofitting could be done in a relatively short time period (one to two months). The businesses located in those UMBs are not a type that could easily relocate, however, to provide that vacant space. While their space is relatively simple, the businesses have some basic requirements that are not easily duplicated. (That is one of the reasons auto-related establishments continue to operate in older garage facilities, many of which are UMBs). Moving tools and equipment, as well as inventory, would not be easy. These businesses are also relatively location-dependent, serving a neighborhood clientele or contributing to a cluster of related repair, parts supply, and service establishments. For all those reasons, auto-related and similar businesses in garage UMBs might close for the duration of the retrofitting project, instead of relocating. Since the duration of retrofitting projects for that type of building would be relatively short, the costs to business owners, in terms of lost sales, may not outweigh the costs and risks associated with relocation, especially given the limited options available.

Implications for Residents

Relocation Payment. Unlike business tenants of unreinforced masonry buildings, residential tenants of UMBs covered by the City's Residential Rent Stabilization Ordinance (buildings having five or more residential rental units, including residential hotels having rooms available for monthly rental), are entitled to payments from their landlord to cover moving and related costs in the event they have to move out of the building during the retrofitting project. The relocation payment for evictions regarding capital improvement or rehabilitation work is limited to $1,000 per tenant; a two-person household could claim up to $2,000; a three-person household, up to $3,000, etc. The allowable expenses for reimbursement include: moving, storage, and related insurance, utility connection charges, and any increased rent for the unit occupied during the relocation period. (If the tenant moves in with family or friends, there are no reimbursable rent expenses.) There is no direct link between the duration of the relocation period and the amount of the relocation

payment. The Rent Stabilization Ordinance limits the maximum relocation period for capital improvement work to three months, although landlords can petition for extension. Depending on the duration of the retrofitting project and the phasing of the work (affecting the length of time any particular household might have to move out of the building for those retrofitting projects undertaken with most occupants remaining in the building), tenants would be able to claim some or all of the maximum relocation payment to offset the financial costs of the retrofitting project for their household.

Because of the relocation payment, most residential tenants of UMBs would share much of the financial burden of moving out of the building during the retrofitting project with the landlord. Business tenants, on the other hand, would bear the full burden of those costs.

Hardships for Those Who Have to Move Out. As discussed above, some UMBs are likely to be vacated for retrofitting projects under Alternative 2 and 3. In fact, under Alternative 3, the UMBs that would be vacated contain one-third of all residential units in UMBs. In addition, some tenants might move out of other UMBs if they could not tolerate the disruption of living through the retrofitting project. Those tenants would tend to be households that could readily find alternative living arrangements. The experience of residential tenants who have to move out would be different from the experience of those who continued to live in the UMB while the construction work was underway. Both would face hardships, though of different types.

Not all tenants who would move out of their building for the duration of the retrofitting project would have the same problems with relocation. Some people would move in with family or friends; for some households, that would be a relatively simple solution; for others it would be a last resort if no alternative housing could be found. Finding alternative housing for the duration of the retrofitting project would be extremely difficult for some tenants; for others, it might be impossible. Although tenants would be eligible for relocation payments to defray the costs of moving, storage, and additional rent during this time period, many of the households living in UMBs have limited housing options and

may not be able to locate somewhere else to live, particularly without assistance. Lower income households would have difficulty finding units they could afford. Families would also have difficulty finding suitable alternative housing; while many already live in over-crowded situations, the over-crowding might be worse during the retrofitting period. The hardships could be most severe for elderly tenants. They would be likely to be long-term tenants and would not easily accept the temporary dislocation caused by the retrofitting program. Elderly tenants might be ill or disabled; they would probably have only limited income. Those factors would compound the psychological difficulties associated with relocation. Language barriers would be another factor exacerbating the difficulties faced by residents who had to relocate. It would be difficult for those who did not speak or understand English to comprehend what was happening to them and to their home--to understand the benefits of seismic retrofitting and the reasons for temporary relocation.

Residential UMBs concentrated in Chinatown and North of Market are home to particular population groups, including people whose options for housing in the City are more limited than those of any others. By comparison to the average apartment tenant in the Van Ness/Polk or Bush Street neighborhoods, for example, Chinatown and North of Market residents would have more problems and more severe hardships associated with displacement during the retrofitting period. Not only are those households made up of recent immigrants, the elderly, the unemployed, and others limited to some of the lowest cost housing in the City, but also they are dependent on their community of neighbors and, often, on the social services that are located nearby.

Tenants of single-room-occupancy (SRO) units in residential hotels are also a special case for concern. At a certain level, the disruption associated with the retrofitting program would be less of a problem for those people, because many are, by definition, more transient and thus would not be as troubled by the need to temporarily relocate as would residents who had been settled for a long time in one place. On the other hand, tenants of SROs have few, if any, other housing options. Many also are dependent on the social services provided nearby. About half of the SRO units in the City are in unreinforced

masonry buildings and they are concentrated in a few key neighborhoods: the Tenderloin, Chinatown, and the Sixth Street Corridor south of Market Street. If a large number of those units were vacated at any one time to undertake the retrofitting work, there would be a serious housing shortage for SRO tenants.

Hardships for Those Who Stay. Residents who remain in the building during the retrofit period would not have to contend with the problems of finding alternative housing. For that reason, even with the potential for reimbursement for moving expenses, residents who have few other housing options would attempt to stay in the UMB. Those who stay would have another set of problems to deal with, but they might judge that the lesser of two evils. Residents living through a retrofitting project would face construction dust and noise and might have to move within the building or close off part of their living quarters for some part of the retrofit period. The construction work would be shielded from residents for the most part, in attempts to minimize disruption. Elderly tenants, potentially those most likely to have to remain in the building, would also probably suffer the most from construction disruption. They might be more sensitive to dust, noise, and drafts; moreover, by contrast to younger tenants who would probably be working, elderly residents would be more likely to be in the building most of the day while the work would be going on.

CONSTRUCTION PERIOD ECONOMIC BENEFITS

The economic benefits of a seismic retrofitting program include business for building contractors, jobs and payroll for construction workers, and spending for the materials needed to complete the retrofitting work. To the extent that relocation is required, there would be other benefits in terms of business for moving, storage, and equipment rental companies and income to landlords of the newly rented space.

Economic Benefits of Construction

Table 37 presents estimates of the magnitude of construction labor, construction payroll, and spending for materials associated with the alternative retrofitting programs.*

TABLE 37

CONSTRUCTION JOBS, PAYROLL AND SPENDING FOR MATERIALS ASSOCIATED WITH RETROFITTING ALTERNATIVES

	Alternative 1	Alternative 2	Alternative 3
Construction Jobs (person-years)	1,500	2,200	2,400
Total Construction Payroll (1989 $)	$73,129,000	$99,776,000	$138,776,000
Spending for Materials (1989 $)	$33,310,000	$78,422,000	$128,611,000

NOTE: The estimates in the table account only for the construction work to complete basic seismic retrofitting. They do not account for premiums for architecturally or historically significant buildings. Work on those more complicated buildings would generate more jobs, payroll and spending for materials. The estimates also do not account for other employment and payroll that would be associated with a seismic retrofitting program. There would be work for engineers, architects, other consultants, and construction project managers, as well as for program administrators and inspectors.

SOURCE: Recht Hausrath & Associates, based on information provided by Rutherford & Chekene

*The estimates of total construction jobs and materials spending were calculated using the conceptual unit-labor and unit-cost factors developed by Don Todd Associates, Inc. (presented in Appendix 3 to the R&C report, 1990). Those unit-cost and unit-labor factors were applied by prototype and by alternative using the "unit-per-square-foot" and "percent-of-buildings-affected" factors from the cost matrices in Section 4: Cost Summary and Report of the R&C report. To estimate construction payroll, the share to general conditions, overhead and profit, bond and insurance allowance and contingency allowance was subtracted from that number, and the residual (total dollars to labor) was further adjusted to account for the 25% sub-contractor's mark-up included in the labor-cost-per-unit factors.

Construction Jobs and Payroll

Construction jobs are expressed as person-years of labor. A person-year is equivalent to one construction worker's labor, full-time, for one year. The number of individual workers working on some aspect of the retrofitting projects would be larger than the number of person-years. The amount of business for building contractors and the number of jobs on retrofitting projects in any one year would depend on the time horizon selected for the program and the phasing of the notices for compliance. The estimates presented here are of the total labor required to complete all of the work for all 2,007 UMBs.

Alternative 1 would support about 1,500 person-years of construction labor, Alternative 2 about 2,200 person years (50% more), and Alternative 3, 2,400 person-years, only about 10% more than Alternative 2. The differences among the alternatives reflect the nature of the strengthening activities required for each alternative as well as the magnitude of the work required.

In all alternatives, there would be job opportunities for workers having varying degrees of skill and experience. All jobs would require foremen, skilled crafts-workers, and helpers/laborers. In terms of the trades involved, skilled carpenters would be in most demand. The strengthening activities under Alternative 1 would require only carpenter foremen, carpenters, and helpers. The more extensive strengthening activities under Alternatives 2 and 3 would require, in addition, steel workers, cement finishers, equipment operators, and bricklayers.

There would be more difference among the alternatives in total construction payroll than in total construction jobs. The retrofitting projects under Alternative 3 would employ more of the relatively higher-wage construction trades. As a result, total wages paid to construction workers under Alternative 3 would be almost twice as large as the wages paid under Alternative 1. Over the course of the retrofitting period, Alternative 1 would generate about $73 million in construction payroll, Alternative 2 about $100 million in

construction payroll, and Alternative 3 about $139 million. Construction payroll would be spent in San Francisco and in the other communities where the workers lived.

The estimates of jobs and payroll presented in the table do not represent the full extent of the employment and payroll impacts of the retrofitting requirements. There also would be jobs in construction project management and work for the administrative functions of construction businesses, as well as work for engineers, architects, and other consultants, and for City program administrators and inspectors.

Spending for Construction Materials

Building materials would be purchased to complete the seismic retrofitting work under each alternative. Table 37 shows the estimates of spending for materials, based on the type and extent of strengthening activities required for each alternative. To complete all retrofitting projects under Alternative 1, about $33 million would be spent on building materials. Spending on materials would come to $78 million under Alternative 2 and $128 million under Alternative 3. Under Alternatives 2 and 3, materials would be a higher percentage of total construction costs than they would be under Alternative 1. Under Alternative 1, materials would be limited to bolts, braces, joists, flooring and sheathing. Under Alternatives 2 and 3, not only would more materials be required for a given project because the work would be more extensive, but also, some projects would require strengthening activities involving more costly materials, such as steel angles and beams, reinforced concrete, or reinforced brick. Building materials suppliers in San Francisco would benefit from the spending associated with a seismic retrofitting program.

Economic Benefits Due to Relocation

There would be economic benefits associated with the relocation required by retrofitting projects. There would be additional business for moving, storage, and equipment rental companies and additional income for landlords of newly rented space.

Economic benefits of these types would occur primarily under Alternatives 2 and 3 because there would be very little relocation associated with construction activities under Alternative 1. Alternative 3 would provide more such benefits than Alternative 2 since more of the buildings would be vacant during retrofitting and a larger percentage of space in occupied UMBs would be required for construction activities. The following describes the benefits that would result.

The need for occupants to relocate or consolidate into a smaller area during the construction period would provide economic benefits to moving, storage, and equipment rental companies. The nature of additional services used by UMB occupants would vary according to the requirements of construction and the needs and resources of occupants. Many of the businesses that relocate all or a portion of their operations would use the services of moving companies. Similarly, some of the residents who move from their unit in the UMB would hire movers. Those who move themselves might rent a large vehicle and possibly moving equipment to aid in their move. Occupants who relocated only temporarily and those who consolidated operations in existing space to avoid a move might rent outside storage facilities to hold non-essential items during the construction period.

There also would be benefits of the retrofitting program to landlords of space that is newly rented to accommodate occupants who relocate from UMBs. The result of retrofitting requirements would be to reduce the amount of commercial/industrial space and the number of housing units available for occupancy in San Francisco and to increase the demand for the remaining supply of space and housing units. Owners of non-UMB buildings that experienced increased occupancy as a result of retrofitting projects would benefit. Businesses and residents relocating during retrofitting projects would become tenants for space that otherwise would remain vacant. From an overall market perspective, the benefits of additional demand would be temporary, lasting until retrofitting projects are completed and UMB space is again available for occupancy (i.e. lasting throughout the construction period). In the case of individual building owners, the benefits could last

longer to the extent that a former UMB tenant makes a permanent move as a result of retrofitting requirements (and the building would not otherwise have been occupied).

Increases in the demand for space to accommodate relocation would result in lower vacancy rates (compared to base case conditions without retrofitting) and possibly higher rents. The extent of these effects would depend, in part, on the time period for the retrofitting program. A shorter time period for the program, compared to a longer period, would result in more additional demand for space at any one time, more effect on availability of space and more reduction of vacancy, and benefits to owners of more buildings (since more additional space would be demanded at any one time).

FISCAL IMPLICATIONS

There would be construction period implications of retrofitting for the City's fiscal situation. There would be revenues generated as a direct result of construction activity and spending. There would be other effects on revenues during the construction period as a result of the disruption and relocation that would occur. There also would be administrative costs associated with implementing the retrofitting program. Each of these types of fiscal effects is discussed below.

Additional Revenues From Construction Activity and Spending

Retrofitting construction activity would generate additional business tax* revenues that would be paid by construction companies, their subcontractors, and architects, engineers, and others involved in project planning and construction. Construction activity also would generate additional sales tax revenues as a result of materials purchases. Most of the construction and related activity would provide additional revenues of these types to the

*Throughout this section, the term "business taxes" refers to both payroll and gross receipts taxes. A business calculates possible taxes based on payroll and on gross receipts and pays the larger amount of the two. Smaller businesses are exempt from either tax and pay a flat registration fee, instead.

City and County of San Francisco. Some would not, to the extent that materials purchases or subcontracting occurred outside the city.

These revenues would be additional in that they would not occur without the retrofitting requirements. They would be temporary, during the construction period. The amounts of additional revenues would vary among alternatives largely as a function of retrofitting construction costs. Thus, additional revenues would be lowest under Alternative 1, higher under Alternative 2, and highest under Alternative 3.

Effects on Revenues as a Result of Disruption and Relocation Due to Construction

There would be effects on public revenues during the construction period as a result of the disruption and relocation that would occur with retrofitting. There are three types of revenue effects. First, the relocation of tenants in situations where entire buildings or portions of buildings were vacated during retrofitting would affect the business taxes paid by landlords because of effects on rental income.* Landlords of UMBs that could not be fully occupied during retrofitting would pay lower business taxes during the construction period as a result of lower rental income. However, there would be offsetting effects to the extent that tenants would relocate within San Francisco and landlords of the newly occupied space would pay higher business taxes as a result of higher rental income. The offsetting effects would not fully compensate for lower revenues from UMBs in situations where business tenants relocate outside San Francisco or where residential tenants move in with family or friends, in which cases there would be a net loss of business tax revenues for a period of time. Further, there would not be offsetting effects on business tax revenues to the extent that tenants did not relocate during retrofitting but instead consolidated their use of space into a smaller area and paid lower rents to landlords. In addition to business tax revenues, there would be similar effects on revenues from utility user taxes and franchise taxes.

*All comercial/industrial space and residential units for rent in buildings with four or more units are subject to business taxes.

Second, tenant relocations would generate additional business tax revenues during the construction period as a function of the additional business generated for moving, storage, and equipment rental companies.

Third, there would be revenue implications of business disruption during construction including that associated with relocations. To the extent that business activity were lower as a result of disruption due to retrofitting, revenues from business taxes, sales taxes, and hotel room taxes could be lower depending on the types of businesses affected. There would be offsetting revenue effects to the extent that business would shift and activity would be higher for other San Francisco establishments as a result of retrofitting in UMBs. Overall, it seems likely that such shifts would occur, but that there could be some net loss in business activity and associated revenues, either because of shifts to locations outside San Francisco or because of lower total activity, particularly in the case of retail businesses.

Among the alternatives, the effects on revenues as a result of disruption and relocation due to retrofitting construction activity would vary according to the descriptions of disruption and relocation earlier in this chapter. Retrofitting under Alternative 1 would have the least effect on revenues. There would be more effect on revenues under Alternative 2. Alternative 3 would have the most effect on revenues because it would result in the most disruption and relocation.

Administrative Costs

There would be administrative costs associated with implementing a retrofitting program in terms of permit processing, plan review, and inspections, as well as notifying owners and monitoring compliance. These costs are likely to be covered by fees and charges for services.

VII. INSTITUTIONAL UMBs: CHARACTERISTICS AND ISSUES FOR RETROFITTING

Of the 2,007 privately-owned unreinforced masonry buildings in San Francisco, 48 have been identified as used solely by institutions such as churches, hospitals, and private schools.* This chapter focuses on those institutional UMBs, describing the uses and types of buildings, the services provided and populations served, and issues associated with retrofitting requirements.

The evaluation of institutional UMBs was performed by Department of City Planning (DCP) staff. The analysis is individualized and is based largely on interviews with the institutional owners. DCP staff sent questionnaires to the 48 building owners and succeeded in interviewing 34 of them.

BUILDING TYPES AND USES

The institutional UMBs include 27 church buildings, two hospital properties, 10 school buildings, one meditation center, one childcare center, three residences for clergy, one home for runaway youths, two nursing homes, and one vacant building.

Institutional UMBs come in all shapes and sizes, ranging from 850 sq. ft. to about 82,000 square feet. Not surprisingly, most of the UMBs are assembly buildings, with characteristics of engineering prototype "O" (see Table 1 and Figure 2 in Chapter II). Others are 2- and 3-story, large area, office and commercial building structures fitting the description of prototype "H". Twenty-five of the institutional UMBs have been designated as having some architectural or historical importance.

*There are UMBs owned by institutions that primarily provide permanent housing for members and/or rental space for commercial uses. Those buildings are categorized as commercial or residential UMBs and are not included in the group of institutional UMBs.

The majority of institutional UMBs (29) are located in RH or RM zoning districts, where housing is the predominant development option. Sixteen other institutional UMBs are in NC, RC or other mixed-use districts, where residential development is encouraged. Three institutional UMBs are located in primarily commercial districts.

SERVICES PROVIDED AND POPULATIONS SERVED

The church buildings provide a variety of services beyond worship and Sunday school. Activities include Community College English classes, tenants rights counseling, preschools, services for the elderly and families, and community group meetings. One church has housing for families upstairs. Three contain schools of various sizes. Based on numbers provided by institution officials, it is estimated that more than 9,000 people use these church buildings. Church membership ranges from fewer than 50 members to as many as 1,000. Although most of the churches serve a local population, four of them largely serve tourists and worshippers from other Bay Area cities, with at least half of their participants coming from outside San Francisco.

Most of the churches in UMBs have operated in those buildings for at least 70 years. In keeping with national and Bay Area trends, membership has declined over the years, particularly in inner-city congregations, as families have moved to the suburbs. At the same time, operating costs for these older structures have increased, straining the budgets of many of these churches.

The two hospital properties include three unreinforced masonry structures: a former animal hospital, a utility building with boilers, and a linen-storage facility. There are plans for all three of the facilities to be demolished. The boiler and linen-storage facilities are planned to be rebuilt; the former animal hospital is proposed to be replaced with a parking lot. Damage from the Loma Prieta Earthquake led to demolition plans for the boiler and linen-storage facilities.

Fourteen institutional UMBs (including some churches) house school facilities. Ten are private elementary school facilities, serving about 2,800 students in total. Two are used by senior high schools with about 180 students. One facility provides vocational training to 40 students, and one serves preschoolers only.

ISSUES ASSOCIATED WITH RETROFITTING REQUIREMENTS

Financing Is the Key Issue for Building Outcomes

Among institutional owners of UMBs, the hospitals appear to have the financial resources to retrofit or demolish and replace their relatively small UMBs. However, this is not the case for the other institutions. Thus, the rest of this section focuses on the potential problems that retrofitting requirements would pose for most of the institutional UMBs.

Unlike owners of commercial/industrial and residential UMBs with a cash flow that could be used to finance retrofitting costs, churches, private schools, and other institutions generally do not have that option. Generally, income for institutions barely covers operating and program costs. In fact, on-going maintenance is often deferred due to lack of funds. Capital improvements generally require a capital fund-raising campaign.

The interviews conducted for this study confirmed that capital fund-raising would have to be a major source of funds for seismic retrofitting work. Some owners mentioned the possibility of selling or leasing parking lots. Others with some rental income from their property mentioned the possibility of increasing rents. A few of the churches interviewed could identify sources of internal funds for retrofitting work, although none were certain that the funds would be sufficient. Most of those interviewed could not identify any such internal capital funds or income sources.

Many of the institutional UMBs with a religious affiliation are part of a larger organization such as an archdiocese or general assembly. However, most of those interviewed did not

know whether higher levels of their organization held reserves that could be available for retrofitting UMBs. Those few who could identify a higher-level source of funding indicated that the institution would have to borrow and repay the funds, and none were confident that the higher-level organization had sufficient resources for seismic retrofitting. The need to commit substantial resources to seismic retrofitting could trigger an evaluation of priorities, considering retrofitting needs along with other demands for available resources.

Unless their buildings contain low-income housing or house a community service, institutional owners, especially churches, have few places to go for outside funding. In other cities, the National Trust for Historic Preservation and the U.S. Department of the Interior have participated in rehabilitation projects that adapt historic church buildings to other uses, such as condominiums and conference space. In some cases, those projects preserved the building, but not the institution, which had to sell to a private developer.

As a result of serious concerns about their ability to raise what could be a large amount of money for seismic retrofitting, very few of the institutions interviewed said that they would retrofit their UMBs if faced with a mandatory program. A few said that they would probably sell or demolish their UMB and move or close their institution. Most could not say what they would do if faced with mandatory retrofitting requirements.

Some institutions that sell their properties may move to a cheaper property on the edge of or outside the city. Others with smaller or less-affluent memberships may have to close permanently, with their members joining other churches and schools of similar type. Because most of the institutional UMBs are located in residentially-zoned districts, a seismic retrofitting program that resulted in the selling of church buildings and private schools eventually could result in new residential development.

Construction Period Issues

Retrofitting churches under Alternatives 2 and 3 may in some cases involve vacating those buildings, according to structural engineers experienced with strengthening church UMBs. Church congregations able to locate an alternative meeting place may prefer to avoid the dirt and dust generated by construction.

In the interviews, officials of some churches, meditation groups, and schools in UMBs could identify places where they could relocate temporarily if seismic retrofitting required closure of their buildings. More of the occupants of institutional UMBs would not have relocation options. They need to be accessible to their client population and have specific facility requirements.

APPENDIX 1: BACKGROUND FOR ESTIMATES OF TOTAL RETROFIT PROJECT COSTS

APPENDIX TABLE 1
COMPONENTS OF TOTAL RETROFIT PROJECT COSTS

Cost Component	Description	Source
Base Costs Per Sq. Ft. by Building Prototype and Alternative (See Table 12 in Chapter III)	Base costs include costs for retrofitting and restoring a moderate level of finish to vacant UMBs. The base costs include all material, equipment, and labor with the appropriate subcontractor's mark-up, general conditions, general contractor's overhead and profit, bond and insurance fees, and contingencies and escalation allowances.	Rutherford & Chekene, Seismic Retrofitting Alternatives for San Francisco's Unreinforced Masonry Buildings: Estimates of Construction Cost & Seismic Damage, 1990 (R & C, 1990), Table 4.1, p. 4-1
Cost Premium for Occupancy	By Alternative, cost premiums for occupancy are applied to base costs per sq. ft. for prototypes where it is assumed that buildings would remain occupied during retrofitting (see Table 13 in Chapter III and associated discussion in text). Cost premiums assumed are the midpoints of the range of premiums for occupancy provided by use category: industrial (20%), commercial (35%), and residential (45% for Alternative 1 and 35% for Alternatives 2 and 3). (Assumptions shown here were those available at the time the economic analysis was done. They differ slightly from those in the R & C final report.)	Based on R & C, 1990, Section 3.5, pp. 3-74 - 3-115 R & C, 1990, p. 4-22
Cost Premium for Historically or Architecturally Significant Buildings	By Alternative and prototype, cost premiums are applied to base costs per sq. ft. for historically or architecturally significant UMBs. Cost premiums apply to buildings that have formal City designation (historic district, landmark, rated significant or contributory in area plan), buildings listed or eligible for listing on the National Register of Historic Places, and buildings rated in the DCP 1976 Survey. Cost premiums assumed are the midpoints of the range of the premiums provided for prototypes by Alternative. The midpoints range from 2% to 20%.	Department of City Planning R & C, 1990, Table 4.2-18, p. 4-25
Costs for Engineering and Architectural Design Fees and Plan Checking and Permit Fees	These costs are estimated at 10 percent of base costs plus cost premium(s) for occupancy and/or historic buildings as applicable.	Department of City Planning

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APPENDIX TABLE 1 (continued)
COMPONENTS OF TOTAL RETROFIT PROJECT COSTS

Cost Component	Description	Source
Lost Revenue Due to Retrofitting	Lost revenue includes revenues not collected during the time the building is not fully occupiable in the usual manner due to retrofitting, and revenues lost during the time of re-leasing space when loss of tenant(s) was due to retrofitting. Lost revenue <u>during retrofit</u> is estimated based on revenue normally collected, the percent of revenue lost during retrofitting, and the duration of retrofitting: • revenue based on use of building and location	Recht Hausrath & Associates (RHA) estimates
	• percent of revenue lost due to retrofit based on: a) percent of building not occupiable (100% if building is vacant during retrofitting and 0-50% if building is occupied during retrofitting, depending on use, prototype, and alternative) and	Based on R & C, 1990, Sections 3.5.1 - 3.5.4, pp 3-74 - 3-85
	b) percent vacancy without retrofit (depending on use and location)	RHA estimates
	• duration of retrofitting based on prototype, alternative, whether building is occupied or vacant during retrofitting, and whether UMB is historic building (in which case time premiums are included based on same percentage increases as cost premiums for historic buildings identified above)	R & C, 1990, Section 3.5.5, pp. 3-85 - 3-115.
	Lost revenue <u>during re-leasing</u> is estimated for situations where the loss of tenants is likely and where re-leasing is expected to result in some loss of revenue. Generally, such situations are those where the building is vacant during retrofitting or where occupants are displaced from a substantial part of the building by construction activities, except for three situations where re-leasing is not expected to impose a cost: residential UMBs with one unit (generally single-family homes with owner-occupants), residential and tourist hotel units in UMBs, and UMBs with units likely to be covered by the Residential Rent Stabilization Ordinance that are assumed to be retrofit in less than 12 weeks (where rules are set up to minimize displacement and enable displaced tenants to return once construction is done).	

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APPENDIX TABLE 1 (continued)
COMPONENTS OF TOTAL RETROFIT PROJECT COSTS

Cost Component	Description	Source
Lost Revenue Due to Retrofitting (continued)	Where applicable, lost revenue during re-leasing is based on the revenue normally collected, the percent of revenue lost during re-leasing, and the duration of re-leasing: • revenue based on use of building and location as above • percent lost and duration estimated to approximate time of re-leasing and amount of space affected (assumed 20% to 50% of revenue lost over 4 to 8 weeks depending on use, prototype, and alternative).	RHA estimates
Costs for Project Management and Administration	This category includes time and costs to building owners involved in dealing with construction activities and tenants. The costs are estimated based on size of building and extent and duration of retrofitting. Costs are calculated as: • $0.025 per sq. ft. per week for small area prototypes and $0.013 per sq. ft. per week for large area prototypes, multiplied by • duration in weeks for retrofitting with occupancy (in all cases) after including time premiums for historic buildings	RHA estimates R & C, 1990, Section 3.5.5, pp. 3-85 - 3-115.
Relocation Costs	Owners of residential UMBs covered by the Residential Rent Stabilization Ordinance (assumed to be UMBs with 5 or more units) are required to pay moving costs of up to $1,000 per person to tenants who must vacate units during retrofitting. For this study, moving costs are converted into a relocation payment per sq. ft. of residential space accounting for both household size and unit size. When the duration of displacement is 12 weeks or more, the relocation cost is estimated by multiplying the relocation payment times the portion of the building not occupiable during the retrofitting (on the assumption that three months of displacement would justify the full $1,000 payment). When the duration of displacement is less than 12 weeks, the cost is prorated as a percentage of 12 weeks.	RHA estimate based on rules and regulations for Residential Rent Stabilization Ordinance

APPENDIX 2: BACKGROUND FOR CALCULATIONS OF OWNER-BURDEN RATIOS

This Appendix provides background for the material presented in Chapter IV. It includes sources for the income assumptions used in calculating the owner-burden ratios, comments on the approach and assumptions, and more detailed back-up tables for the text discussion.

SOURCES FOR INCOME ASSUMPTIONS

As described in the text, the owner-burden ratios identify the percentage of net building income that would be required to cover the costs of the retrofitting alternatives. The ratios assume existing uses and rent levels. Assumptions about net income were developed by Recht Hausrath & Associates (RHA), specific to different land uses and locations (defining different real estate sub-markets). Rent, vacancy, and operating costs assumptions come from a variety of sources as listed below. Information was gathered by RHA and Department of City Planning (DCP) staff. The sources include:

- real estate company reports, proformas, and multiple listings;
- San Francisco Board of Realtors data for property sales in the Tenderloin;
- newspaper articles and classified listings;
- field work done by DCP staff;
- San Francisco Bureau of Building Inspection, Division of Apartment and Hotel Inspection;
- Golden Gate Hotel Association;
- San Francisco Convention and Visitors Bureau;

- Earthquake Hazards and Housing, 1987 study by Mary Comerio, including background data and studies; and

- Research done by RHA for other economic studies of San Francisco's downtown, industrial, and neighborhood areas.

Some of the above referenced information is specific to the population of UMBs in San Francisco; most is for buildings of similar types and uses in similar locations.

For residential UMBs covered by the Residential Rent Stabilization Ordinance, assumptions were developed for "occupied" rents based on factors reflecting the differences between current rents for all occupied housing units (including both those recently rented and those with longer-term occupants whose annual rent increases have been regulated by ordinance) and market rents for housing units recently rented or currently on the market. The factors relating occupied and market rents are specific to types of housing (residential hotels, apartments) and to locations. The factors were developed by RHA based primarily on data from the Comerio study and on information for selected actual buildings in areas where UMBs are concentrated. The estimates were evaluated in terms of the relative rates of turnover they reflect.

COMMENTS ON APPROACH AND ASSUMPTION

As explained in Chapter IV, the owner-burden ratio is designed to provide a relatively simple measure of economic hardship that can be calculated for all UMBs. As calculated for Chapter IV, the owner-burden ratios compare the costs of retrofitting to building incomes assuming existing uses and rent levels.

The results are useful for identifying differences among the alternatives since the ratios calculated for each alternative reflect the same basic assumptions. While different assumptions could result in higher or lower ratios in the future, those differences would affect all the alternatives and thus would not alter the relative comparison among them. Concern for how the ratios could differ based on different

assumptions (or the consideration of more factors) is more appropriately tested for the preferred alternative, in the process of refining a retrofitting program.

For example, retrofitting projects would be undertaken over a period of years, depending somewhat on the phasing and time period for compliance. In the meantime, construction costs and net incomes (rents net of operating costs) expressed in 1989 dollars will change over time. It is possible that the relationship between costs and incomes could stay the same over time so that the ratios would not be different. It is more likely that construction costs would increase faster than rental incomes for many of the UMB properties. In that case, the owner-burden ratios in Chapter IV would be underestimates.

Another issue concerns the relationship between retrofitting costs and building incomes once the retrofitting work is begun. It is possible that incomes would increase over time (over and above increases in rents to cover increases in operating costs), while payments on loans for retrofitting work would remain fixed. If so, the owner-burden ratios in Chapter IV would be overestimates. While this could be the case for some UMBs, it probably would not be the situation for all of them.

There are additional issues regarding assumptions relevant only to residential UMBs covered by the Residential Rent Stabilization Ordinance. The issues reflect the difficulty of accounting for regulations that involve conditions specific to individual buildings and rental units in an aggregate analysis. As noted in a footnote to the text in Chapter IV, assumptions about tenant turnover affect the amount of pass-through income included in the owner-burden ratios. The calculations assume that existing tenants remain after retrofitting and that 10% leave each year thereafter so that all existing tenants are gone in 10 years after retrofitting. As a result, pass-through income to owners declines over time for the 10 years following retrofitting. Many other scenarios are possible. Thus, pass-through income could be higher or lower than estimated based on the above simplifying assumptions. Different amounts of pass-

through income would result in higher or lower owner-burden ratios for the residential UMBs affected.

Another issue related to pass-through income is that the estimates are based on the average rents assumed for types of housing by location. Actual rents will vary from these averages. The estimates assume that annual increases in rents to pass through retrofitting costs are limited to 10% of these average rents. Although Rent Board Rules and Regulations allow for annual increases of $30 a month if 10% of rent is less than that amount, the average rents used here generally did not result in rents at the lower levels. Thus, the amount of annual increase in pass-through was estimated at 10% of average rents. However, when done on an individual building basis, the $30 amount could apply in lower-rent situations such that, overall, pass-through amounts would be higher than estimated here. Thus, owner-burden ratios would be lower than estimated for this analysis.

DETAILED BACK-UP TABLES

Appendix Tables 2 through 6 that follow provide more detailed tabulations of the owner-burden ratios from the perspective of different uses, locations, and building prototypes. The tabulations are relevant to the text discussion in Chapter IV.

APPENDIX TABLE 2
OWNER-BURDEN RATIOS FOR COMMERCIAL/INDUSTRIAL UMBs: PERCENTAGE DISTRIBUTIONS FOR USES

Owner-Burden Ratios	TOTAL	Commercial	Office	Commercial in Industrial Buildings	Industrial Warehouse	Garage	Hotel	Theaters & Clubs
	%	%	%	%	%	%	%	%
ALTERNATIVE 1								
0 - 20%	38	42	58	24	25	29	55	-
21 - 40%	50	49	36	54	59	61	39	70
41 - 60%	11	9	5	22	16	10	6	27
61 - 80%	1	1	1	-	-	-	-	3
81 - 100%	-	-	-	-	-	-	-	-
> 100%	-	-	-	-	-	-	-	-
	100	100	100	100	100	100	100	100
ALTERNATIVE 2								
0 - 20%	10	16	14	-	small	-	24	-
21 - 40%	63	64	73	52	63	68	36	17
41 - 60%	24	18	11	43	33	31	37	56
61 - 80%	3	1	2	5	4	1	-	27
81 - 100%	small	1	-	-	-	-	3	-
> 100%	-	-	-	-	-	-	-	-
	100	100	100	100	100	100	100	100
ALTERNATIVE 3								
0 - 20%	3	7	2	-	-	-	-	-
21 - 40%	29	33	30	13	27	35	27	-
41 - 60%	48	44	56	58	50	50	43	20
61 - 80%	14	13	8	18	16	15	12	40
81 - 100%	5	2	3	11	7	-	18	23
> 100%	1	1	1	-	small	-	-	17
	100	100	100	100	100	100	100	100
NUMBER OF UMBs	1,171	505	208	67	256	72	33	30

NOTE: Owner-burden ratios identify the percentage of net building income that would be required to cover the costs of the retrofitting alternatives. Costs are total costs annualized assuming 12% interest and 10-year amortization. Net income is gross building receipts minus operating expenses, insurance, and real estate taxes. The owner-burden ratios assume current uses and rent levels except for increased rents allowed under the pass-through provisions for capital improvements for residential UMBs subject to the Residential Rent Stabilization Ordinance. No economic assistance is assumed.

SOURCE: Recht Hausrath & Associates

APPENDIX TABLE 3
OWNER-BURDEN RATIOS FOR COMMERCIAL/INDUSTRIAL UMBs: PERCENTAGE DISTRIBUTIONS FOR LOCATIONS

Owner-Burden Ratios	TOTAL	C-3-O North	C-3-O South	Union Square	Mid-Mkt /C-3-S	Civic Center	Rincon Hill	SLI/ SLR/ RSD	Other SOM	Show Place	NE Waterfront
	%	%	%	%	%	%	%	%	%	%	%
ALTERNATIVE 1											
0 - 20%	38	60	42	96	22	43	75	58	23	61	54
21 - 40%	50	40	58	4	53	51	25	42	51	39	46
41 - 60%	11	-	-	-	24	6	-	-	25	-	-
61 - 80%	1	-	-	-	1	-	-	-	1	-	-
81 - 100%	-	-	-	-	-	-	-	-	-	-	-
> 100%	-	-	-	-	-	-	-	-	-	-	-
	100	100	100	100	100	100	100	100	100	100	100
ALTERNATIVE 2											
0 - 20%	10	31	2	60	2	-	-	-	-	-	4
21 - 40%	63	69	83	39	48	88	88	82	56	100	94
41 - 60%	24	-	15	1	45	12	12	18	41	-	2
61 - 80%	3	-	-	-	4	-	-	-	3	-	-
81 - 100%	sm	-	-	-	1	-	-	-	-	-	-
> 100%	-	-	-	-	-	-	-	-	-	-	-
	100	100	100	100	100	100	100	100	100	100	100
ALTERNATIVE 3											
0 - 20%	3	2	-	34	-	-	-	-	-	-	-
21 - 40%	29	60	27	39	10	45	25	24	20	22	40
41 - 60%	48	38	70	24	40	43	75	67	52	33	58
61 - 80%	14	-	3	3	35	12	-	6	19	39	2
81 - 100%	5	-	-	-	8	-	-	3	9	6	-
> 100%	1	-	-	-	7	-	-	-	-	-	-
	100	100	100	100	100	100	100	100	100	100	100
NUMBER OF UMBs	1,171	65	104	101	83	51	8	33	151	18	123

(continued on next page)

APPENDIX TABLE 3 (Continued)
OWNER-BURDEN RATIOS FOR COMMERCIAL/INDUSTRIAL UMBs: PERCENTAGE DISTRIBUTIONS BY LOCATION

Owner-Burden Ratios	Chinatown	Van Ness	Polk Street	NOMA/ SoCAL	NCDs	Neighbor-hoods	NC-3	Mission Com'l	Industrial Areas
	%	%	%	%	%	%	%	%	%
ALTERNATIVE 1									
0 - 20%	28	42	61	13	55	12.5	12	-	2
21 - 40%	72	29	36	69	45	62.5	64	75	71
41 - 60%	-	29	3	18	-	22.5	24	23	23
61 - 80%	-	-	-	-	-	2.5	-	2	4
81 - 100%	-	-	-	-	-	-	-	-	-
> 100%	-	-	-	-	-	-	-	-	-
	100	100	100	100	100	100	100	100	100
ALTERNATIVE 2									
0 - 20%	13	5	18	-	35	2.5	-	-	-
21 - 40%	73	63	82	69	65	40	46	29	3
41 - 60%	14	27	-	21	-	50	42	65	77
61 - 80%	-	5	-	7	-	7.5	9	6	20
81 - 100%	-	-	-	3	-	-	3	-	-
> 100%	-	-	-	-	-	-	-	-	-
	100	100	100	100	100	100	100	100	100
ALTERNATIVE 3									
0 - 20%	1	-	18	-	-	-	-	-	-
21 - 40%	33	26	58	26	75	25	9	-	4
41 - 60%	46	66	18	43	20	40	52	71	39
61 - 80%	18	3	6	18	5	28	24	19	30
81 - 100%	2	3	-	10	-	5	9	8	25
> 100%	-	2	-	3	-	2	6	2	2
	100	100	100	100	100	100	100	100	100
NUMBER OF UMBs	101	38	33	61	20	40	33	52	56

NOTE: Owner-burden ratios identify the percentage of net building income that would be required to cover the costs of the retrofitting alternatives. Costs are total costs annualized assuming 12% interest and 10-year amortization. Net income is gross building receipts minus operating expenses, insurance, and real estate taxes. The owner-burden ratios assume current uses and rent levels except for increased rents allowed under the pass-through provisions for capital improvements for residential UMBs subject to the Residential Rent Stabilization Ordinance. No economic assistance is assumed.

SOURCE: Recht Hausrath & Associates

APPENDIX TABLE 4
OWNER-BURDEN RATIOS FOR RESIDENTIAL UMBs: PERCENTAGE DISTRIBUTIONS FOR USES

Owner-Burden Ratios	TOTAL	Dwellings & Flats without Commercial	Flats with Commercial	Apartments with Commercial	Apartments without Commercial	Residential Hotels	Mixed Residential & Tourist Hotels
	%	%	%	%	%	%	%
ALTERNATIVE 1							
0 - 20%	44	32	5	52	54	22	76
21 - 40%	39	32	36	41	31	58	23
41 - 60%	13	18	55	7	7	18	1
61 - 80%	3	17	4	-	6	1	-
81 - 100%	1	1	-	-	2	-	-
> 100%	small	-	-	-	small	1	-
	100	100	100	100	100	100	100
ALTERNATIVE 2							
0 - 20%	4	33	-	-	-	1	10
21 - 40%	55	33	76	63	45	54	69
41 - 60%	27	27	21	27	37	24	17
61 - 80%	9	7	3	9	8	13	3
81 - 100%	4	-	-	1	9	7	-
> 100%	1	-	-	-	1	1	1
	100	100	100	100	100	100	100
ALTERNATIVE 3							
0 - 20%	1	6	-	-	-	-	1
21 - 40%	12	50	19	10	6	3	18
41 - 60%	40	12	67	45	34	46	36
61 - 80%	28	24	12	30	33	21	34
81 - 100%	10	8	2	9	13	15	7
> 100%	9	-	-	6	14	15	4
	100	100	100	100	100	100	100
NUMBER OF UMBS /a/	785	72	58	220	202	150	83

NOTE: Owner-burden ratios identify the percentage of net building income that would be required to cover the costs of the retrofitting alternatives. Costs are total costs annualized assuming 12% interest and 10-year amortization. Net income is gross building receipts minus operating expenses, insurance, and real estate taxes. The owner-burden ratios assume current uses and rent levels except for increased rents allowed under the pass-through provisions for capital improvements for residential UMBs subject to the Residential Rent Stabilization Ordinance. No economic assistance is assumed.

/a/ There are 788 residential UMBs. Owner-burden ratios were not calculated for three UMBs because of missing data.

SOURCE: Recht Hausrath & Associates

APPENDIX TABLE 5
OWNER-BURDEN RATIOS FOR RESIDENTIAL UMBs: PERCENTAGE DISTRIBUTIONS FOR LOCATIONS

Owner-Burden Ratios	TOTAL	Bush Corridor	China-town	North Beach	Down-town	NOMA	NOMA 6th St.	SOMA	SOMA 6th St.	Civic Center	Mid Van Ness	North Van Ness	Mission	Outlying
	%	%	%	%	%	%	%	%	%	%	%	%	%	%
ALTERNATIVE 1														
0 - 20%	44	73	14	6	75	47	58	42	52	78	68	36	12	55
21 - 40%	39	21	48	60	8	44	36	50	39	22	27	42	68	37
41 - 60%	13	6	29	17	-	8	6	8	4.5	-	5	22	12	5
61 - 80%	3	-	6	17	17	1	-	-	4.5	-	-	-	8	1.5
81 - 100%	1	-	2	-	-	-	-	-	-	-	-	-	-	1.5
> 100%	sm	-	1	-	-	-	-	-	-	-	-	-	-	-
	100	100	100	100	100	100	100	100	100	100	100	100	100	100
ALTERNATIVE 2														
0 - 20%	4	-	sm	-	17	-	-	16.5	13	22	-	-	4	38
21 - 40%	55	66	68	40	33	42	36	42	44	78	54	70	16	47
41 - 60%	27	30	15	50	42	38	50	25	17	-	14	8	80	12
61 - 80%	9	3	14	7	-	7	5.5	-	17	-	32	19	-	3
81 - 100%	4	1	2	-	8	12	5.5	16.5	9	-	-	3	-	-
> 100%	1	-	1	3	-	1	3	-	-	-	-	-	-	-
	100	100	100	100	100	100	100	100	100	100	100	100	100	100
ALTERNATIVE 3														
0 - 20%	1	-	-	-	-	-	-	-	-	11	-	-	-	7
21 - 40%	12	9	13	17	-	3	3	25	4	11	15	19	4	51
41 - 60%	40	55	52	17	59	25	16	25	43	33.5	36	25	44	20
61 - 80%	28	27	19	36	33	36	28	33	22	11	59	42	28	17
81 - 100%	10	7	6	20	8	20	14	17	22	33.5	-	8	12	5
> 100%	9	2	10	10	-	16	39	-	9	-	-	6	12	-
	100	100	100	100	100	100	100	100	100	100	100	100	100	100
NUMBER OF UMBs /a/	785	180	207	30	12	133	36	12	23	9	22	36	25	60

NOTE: Owner-burden ratios identify the percentage of net building income that would be required to cover the costs of the retrofitting alternatives. Costs are total costs annualized assuming 12% interest and 10-year amortization. Net income is gross building receipts minus operating expenses, insurance, and real estate taxes. The owner-burden ratios assume current uses and rent levels except for increased rents allowed under the pass-through provisions for capital improvements for residential UMBs subject to the Residential Rent Stabilization Ordinance. No economic assistance is assumed.

/a/ There are 788 residential UMBs. Owner-burden ratios were not calculated for three UMBs because of missing data.

SOURCE: Recht Hausrath & Associates

APPENDIX TABLE 6
OWNER-BURDEN RATIOS FOR SEISMIC RETROFITTING ALTERNATIVES: ALL UMBs, PERCENTAGE DISTRIBUTIONS FOR BUILDING PROTOTYPES

Owner-Burden Ratios	Building Prototypes															
	TOTAL	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
ALTERNATIVE 1																
0 - 20%	40	11	25	78	57	1	74	10	61	50	90	1	17	40	95	3
21 - 40%	46	58	71	20	42	63	26	62	38	46	10	37	78	59	5	69
41 - 60%	12	30	4	2	1	36	-	23	1	4	-	44	5	1	-	28
61 - 80%	2	1	-	-	-	-	-	4	-	-	-	14	-	-	-	-
81 - 100%	sm	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
> 100%	sm	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-
	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
ALTERNATIVE 2																
0 - 20%	8	13	12	9	13	1	1	6	15	17	21	3	6	-	4	-
21 - 40%	60	62	58	79	71	55	73	72	69	33	66	65	72	3	52	16
41 - 60%	25	25	26	9	15	39	25	19	15	39	11	26	21	38	43	56
61 - 80%	5	-	4	3	1	5	1	2	0.5	7	2	4	1	36	1	25
81 - 100%	2	-	-	-	-	-	-	-	0.5	4	-	1	-	20	-	3
> 100%	sm	-	-	-	-	-	-	1	-	-	-	1	-	3	-	-
	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
ALTERNATIVE 3																
0 - 20%	2	4	7	-	1	1	-	4	3	9	4	-	1	-	-	-
21 - 40%	23	35	45	8	3	3	41	25	45	16	14	16	38	1	3	3
41 - 60%	45	51	43	37	47	62	50	57	34	47	50	57	57	41	8	12
61 - 80%	19	10	4	40	32	19	8	11	15	19	21	20	3	38	36	41
81 - 100%	7	-	1	12	14	15	1	2	2	5	6	4	1	17	21	25
> 100%	4	-	-	3	3	-	-	1	1	4	5	3	-	3	32	19
	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
NUMBER OF UMBs /a/	1,956	133	169	134	96	89	141	236	168	70	82	162	144	139	161	32

NOTE: Owner-burden ratios identify the percentage of net building income that would be required to cover the costs of the retrofitting alternatives. Costs are total costs annualized assuming 12% interest and 10-year amortization. Net income is gross building receipts minus operating expenses, insurance, and real estate taxes. The owner-burden ratios assume current uses and rent levels except for increased rents allowed under the pass-through provisions for capital improvements for residential UMBs subject to the Residential Rent Stabilization Ordinance. No economic assistance is assumed.

/a/ There are 1,959 commercial/industrial and residential UMBs. Owner-burden ratios were not calculated for three UMBs because of missing data.

SOURCE: Recht Hausrath & Associates

APPENDIX 3: LONGER-TERM BUILDING OUTCOME AND LAND USE IMPACT METHODOLOGY

The purpose of the longer-term impact analysis is to determine how the retrofitting requirements would make a difference in building owners' decisions about uses for their UMB property in the future and then to determine the eventual impact of those differences for the supply and cost of commercial and industrial space and housing in San Francisco.

BASE CASE SCENARIO

To accomplish this purpose, the longer-term analysis requires a base case scenario of future real estate market conditions and the choices that would make sense for owners of UMBs given those conditions and no retrofitting requirements. The base case scenario identifies longer-term building outcomes for UMBs in the absence of retrofitting requirements, considering the existing characteristics of the UMBs as well as the range of potential uses and development options for UMBs and UMB sites. The base case scenario of building outcomes reflects evaluation of how likely UMB owners would be to participate in new development projects, convert their property to higher-rent-paying uses, upgrade the quality of the space and tenants over time, or accommodate more business or commercial activity over time with no change in use.

Real Estate Analysis: Demand and Supply Factors

The analysis to develop the base case scenario considered overall demand and supply for commercial and industrial space and for housing. Demand factors include near- and longer-term growth potentials for business activities and population in San Francisco. The analysis assesses the relative strength of demand for commercial and industrial space and for housing of various types, in various locations, and at various

rent levels. Supply factors include potentials for development and land use change as regulated by current zoning controls and other land use policies and ordinances regulating development in San Francisco. The regulations are important for two reasons. First, they affect the overall amount of development and land use change allowed in various locations throughout the City. Second, they affect the type and amount of development allowed on individual sites, an important consideration for determining the alternatives to retrofitting for owners of UMBs. Supply factors also include the attributes of various locations for attracting uses of different types.

The zoning controls and other regulations considered in the land use analysis included: the Downtown Plan Zoning Ordinance, including Article 11 regulating conservation districts and buildings rated architecturally or historically significant; the recently revised South of Market Plan; Chinatown, Van Ness Avenue, and North of Market plans; Article 10 protections for landmark buildings and historic districts; controls governing allowable uses and building envelopes in neighborhood commercial districts; controls on residential demolition and conversion and on the density of new residential development; the Residential Hotel Unit Conversion and Demolition Ordinance; and other controls on building density and allowable uses associated with zoning districts throughout the City. For the building outcome analysis, Proposition M's annual limit on office project approvals was not interpreted as a constraint on options for owners of UMBs. As a result, the analysis identifies situations in which the retrofitting requirements would encourage new development regardless of the slower pacing intended by the annual limit procedures.

Characteristics of UMBs and of Real Estate Sub-Markets

The real estate analysis for the longer-term land use impact assessment focused on real estate sub-markets and the role of UMBs and UMB sites in those sub-markets. The analysis drew from the large amount of data and information collected to describe UMBs: size (both square feet of space and number of housing units), use, location,

and building prototype. With that basic information, it was possible to assign additional descriptive characteristics to UMBs (employment, population, rent levels for commercial and industrial space and for housing) that place the UMBs in the context of the larger population of other commercial and residential buildings in various parts of the City. (Most of that descriptive information is presented in Chapter II of the report.)

Developing the base case scenario of building outcomes over the longer term also required a generalized picture of how various sub-markets might be defined in the future: types of commercial and industrial space and housing available, locations where certain types of space and housing would be available, rent levels for different types of space and housing, the range of space and housing options businesses and residents might have, and the level of rents businesses and residents would be willing to pay. The large amount of information describing the existing characteristics of UMBs was useful in identifying how the role of those buildings might change over time as real estate market conditions changed.

The real estate market background developed in the base case scenario serves several purposes. It enables conclusions about the longer-term use of UMB properties, including assessment of the likelihood of development options that could be alternatives to retrofitting. Identification of the role of UMBs in the various real estate sub-markets (types of space or housing, location, intensity of use, etc.) provides the basis for subsequent conclusions about the likelihood that retrofitting would be a feasible option for building owners. The base case scenario also provides a context for evaluating the impacts of the differences in development and land use change attributable to the retrofitting requirements. How tight or loose market conditions would be in the various sub-markets in the base case is the basis for conclusions about how changes in the supply of new space, converted space, or existing space as a result of the retrofitting requirements would affect options for businesses or residents looking

for space in that sub-market or for owners of property competing for tenants in that sub-market.

Two Time Horizons

The base case scenario has two time horizons: expected building outcomes for UMB properties over the next 10 years--through the year 2000 and the additional changes that could be expected over the following 20 years--to 2020. The two time periods provide the basis for considering whether the retrofitting requirements would affect the timing of future development. For example, one way of showing the impact of the retrofitting requirements is to show that a UMB that would be part of a new development site after 2000 in the base case scenario or would be converted to office use from warehouse use after 2000 would instead be demolished for new development or converted before 2000 under a scenario with a retrofitting requirement.

Background Economic Analysis

The longer-term real estate analysis for the various sub-markets of commercial and industrial space and housing in the City is based on extensive work Recht Hausrath & Associates has completed for other economic studies in San Francisco. The work has included preparation of long-term (through 2020) forecasts of employment growth, building development, and absorption, and of population growth and housing development for the City as a whole, with emphasis on the downtown areas (including South of Market and nearby industrial areas) where UMBs are concentrated. The work also involved research into the characteristics of existing businesses and households, assessment of the impacts of various zoning controls and planning policies on development patterns and the future supply and cost of space, and estimates of how the characteristics of businesses and residents might change over time as a result.

Although those forecasting efforts and related assessments of changing real estate market conditions relevant to businesses, households, and building owners were not directly translated to the economic analysis for the UMB studies, they provided the background context necessary to evaluating the role of UMBs and UMB sites in the future: activities likely to support demand for space of various types in difference locations, rent-paying ability of potential tenants, and the relative rent-levels that distinguish locations and types of space or housing. Included in the related background work are: forecasts and impact assessments for the Downtown Plan Environmental Impact Report and related studies; forecasts and analysis for South of Market planning; forecasts and impact assessment for the Mission Bay EIR and related planning studies; Fisherman's Wharf area market analyses; forecasts and analysis of demand for space in the South Bayshore and other older industrial districts; economic analysis for neighborhood commercial re-zoning and for the Office-Affordable Housing Production Program.

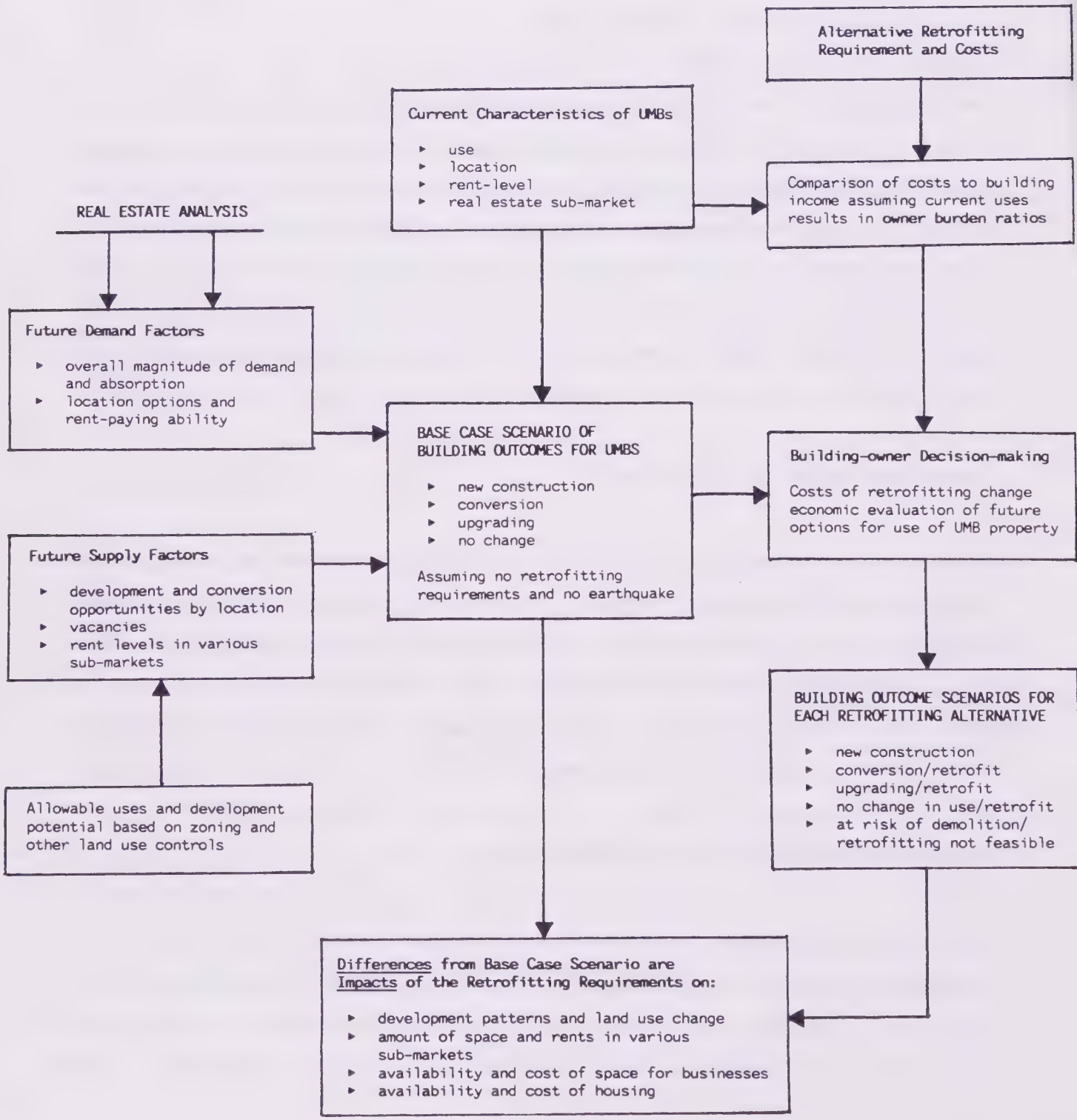
COMPONENTS OF THE ANALYSIS

Appendix Figure 1 presents a flow chart of the various components of the building outcome and land use impact analysis. The chart shows how the various independent components of the methodology are eventually combined for conclusions about impacts of the retrofitting requirements. Boxes in the center and to the left on the chart refer to the development of the base case scenario of future building outcomes for UMBs in the absence of retrofitting requirements.

BUILDING-OWNER DECISION-MAKING

Boxes to the right on the chart relate to the retrofitting requirements and to the methodology for developing future building outcome scenarios for each retrofitting alternative. The approach focuses on the decision-making process of the building owner and on determination of whether the costs of retrofitting requirements would

APPENDIX FIGURE 1
OVERVIEW OF METHODOLOGY FOR BUILDING OUTCOME AND LAND USE IMPACT ANALYSIS



change the owner's decisions about the future use of the UMB property.

Retrofitting requirements and their costs would affect an owner's evaluation of future options for the UMB property in two ways. The primary effect would be on the value of the existing UMB. Retrofitting costs would reduce the value of existing UMBs, thereby changing the comparison between the existing UMB and other options for the property (new construction, conversion, upgrading). The value to be gained from choosing another option instead of retaining the existing UMB would be increased as a result of the retrofitting requirements. Whether the change in "value gain" would be enough to result in a different building outcome than under the base case without retrofitting requirements would depend on the specifics of the situation.

The other effect would be on the feasibility and value of other options, primarily conversion and upgrading. To the extent there would be efficiencies and therefore cost savings of doing conversion or upgrading along with the retrofitting work, the feasibility of those options would be increased (i.e., if potential revenues are the same but costs would be less, the net of the two would be larger). This effect would be in addition to the first described above.

For both of the effects just described, the costs of retrofitting would change the economic evaluation of future options for use of the UMB property. Compared to the base case without retrofitting, the choice of retaining the UMB in its existing use and condition would become less desirable relative to other options.

In many situations, the effect of retrofitting requirements is not expected to be significant enough to result in a different building outcome from what is otherwise expected under the base case. In other situations, the owner is likely to proceed with construction, conversion, or upgrading instead of doing the retrofitting and retaining the existing use of the UMB. Generally, the retrofitting requirements would make a difference in building outcomes for situations in which the feasibility of another option

was positive (future value supported by expected revenues exceeds development costs), but, before consideration of retrofitting, the relatively high value of the existing UMB meant that there was little, if any, value to be gained from that other option. In those situations, relatively high retrofitting costs could make a significant difference in the consideration of the value of the existing UMB, thus changing the economic evaluation of options.

An example is provided by the case of mixed residential and tourist hotels. In some situations, the option of converting the remaining residential units to tourist use and upgrading the building would be feasible (i.e., future revenues would justify the costs of converting, including the buy-out cost of converting a residential unit to tourist use). However, in the base case, the economics of retaining the existing mix of uses (and avoiding the relatively high costs of converting) would be preferable. In other words, there would be no gain in value from undertaking the conversion. Thus, the base case scenario would assume no change in use. However, in several of those situations, the costs of retrofitting requirements under Alternatives 2 and 3 would be high enough to change the economic evaluation. As a result of the cost of retrofitting, the value of the property under the option of retaining the existing mix of uses would be lowered relative to the conversion option such that there now would be a gain in value from undertaking the conversion. Thus, the scenarios for Alternatives 2 and 3 would show a different building outcome than the base case scenario.

Generally the retrofitting alternatives would make relatively small differences in the value to be gained from new construction. That is because the value of the existing condition, both with and without retrofitting, is small relative to the value from a larger, new building often covering several sites. Thus, all other things being equal, retrofitting requirements would make more of a difference in the decision to proceed with new construction when there are several UMBs on the development site, and when the existing building(s) is relatively large compared to the potential new development.

By influencing the economic evaluation of future options for use of the UMB property, the retrofitting requirements generally would affect the **timing** of new construction, conversions, or upgrading where the potentials for adding space or changing building use already exist. Retrofitting by itself would not create or significantly change market potentials for different uses in different locations. Rather, the requirements would change how the status of the UMB, considering existing uses and those market potentials, would compare to other development opportunities.

BUILDING OUTCOME SCENARIOS FOR THE ALTERNATIVES AND IDENTIFICATION OF IMPACTS

In addition to the evaluation of building economics, the analysis to develop building outcome scenarios for each alternative also considered the overall magnitude of demand for additional space of various types, as well as the competitive ability of the UMB property to capture a share of that demand vis-a-vis other supply options. As described in the text of Chapter V, potential effects of retrofitting requirements on building outcomes would be limited in some locations because of the overall outlook for future demand for additional space of various types and the potential for additional supply in other, more preferred locations.

The building outcome scenarios for the retrofitting alternatives also identify UMBs that would not be retrofit and would be at risk of eventual demolition as a result of the retrofitting requirements. In those situations the costs of retrofitting would exceed the value of the building. In addition, other options would be limited, at least for some time into the future. In many situations, market demand for upgraded, converted, or new space in the area would be lacking. There also could be other prohibitive costs associated with changing uses or with new development (such as the requirement to replace residential units demolished for new construction). Thus, it would make more economic sense for owners of UMBs at risk to demolish the building and hold or sell the land rather than undertake the required retrofitting project.

The building outcome scenarios for each retrofitting alternative are compared with the base case scenario. The **differences** from the base case scenario are the **impacts** of the retrofitting requirements on development patterns and land use change and on the amount of space and, potentially, on the rents in various sub-markets. (See box at bottom of chart in Appendix Figure 1.) Both the scenarios and the impacts are described in Chapter V of the report.

DETAILED BACK-UP TABLES

Appendix Tables 7 through 10 that follow provide back-up tables for the discussion of socioeconomic impacts near the end of Chapter V. The tables describe rent impacts for tenants of UMBs covered by the Residential Rent Stabilization Ordinance. Tables 7 and 8 account for the building outcomes expected as a result of retrofitting. Tables 9 and 10 do **not** account for building outcomes and are provided to identify the impacts if **all** UMBs were retrofit.

BACK-UP TABLES

APPENDIX TABLE 7
SUMMARY OF HOW HIGHER RENTS DUE TO RETROFITTING COULD COMPARE TO MARKET RENT LEVELS, FOR UMBs COVERED BY THE RESIDENTIAL RENT STABILIZATION ORDINANCE THAT ARE RETROFIT PER REQUIREMENTS

	Distribution of Housing Units					
	Alternative 1		Alternative 1		Alternative 3	
	No. Units	Percent	No. Units	Percent	No. Units	Percent
Apartments						
Higher Rents Eventually Reach Market Levels	53	1	1,346	14	1,749	31
Higher Rents Remain Below Market Levels	10,274	99	8,259	86	3,805	69
Subtotal	10,327	100%	9,605	100%	5,554	100%
Residential Hotel Units						
Higher Rents Eventually Reach Market Levels	3,002	29	6,913	79	3,153	79
Higher Rents Remain Below Market Levels	7,485	71	1,839	21	843	21
Subtotal	10,487	100%	8,752	100%	3,996	100%
TOTAL UNITS						
Higher Rents Eventually Reach Market Levels	3,055	15	8,259	45	4,902	51
Higher Rents Remain Below Market Levels	17,759	85	10,098	55	4,648	49
TOTAL	20,814	100%	18,357	100%	9,550	100%

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APPENDIX TABLE 7 (continued)
SUMMARY OF HOW HIGHER RENTS DUE TO RETROFITTING COULD COMPARE TO MARKET RENT LEVELS, FOR UMBs COVERED BY THE RESIDENTIAL RENT STABILIZATION ORDINANCE THAT ARE RETROFIT PER REQUIREMENTS

NOTE: This table accounts for the building outcomes expected as a result of retrofitting requirements. The housing units described in this table are those in UMBs that would be retrofit per requirements for the Alternatives. The table excludes units in existing UMBs that eventually would be demolished or converted to other uses as an alternative to retrofitting.

Under Rent Board Rules and Regulations governing rent increases for capital improvements such as retrofitting, annual increases in rents would be limited each year and those annual increases would accumulate over the years until the total amount of additional rent for retrofitting equals the annual amortized cost of retrofitting. There also would be a market limit beyond which landlords would not be able to pass through costs of retrofitting to tenants. Once either of these "limits" was reached, the total additional rent would remain at that level for subsequent years until the unit's share of retrofitting costs was paid. Rents would return to the amounts they would have been without the addition for retrofitting once the unit's share of costs was paid. The results summarized in this table describe the extent of potentially higher rents for existing tenants remaining in their retrofitted units in terms of whether tenants would eventually be paying market rents for a period of time as a result of retrofitting, or whether they would be paying rents that remained below market levels even thought those rents were higher because of retrofitting.

The calculations estimating rent increases are based on average rents for types of housing by location. Rents for individual units and buildings would vary from these averages. It is not possible to account for such specific conditions in an aggregate analysis of this type. The results above are most useful in highlighting the differences between the alternatives because the calculations for each are based on the same assumptions and approach.

The results above incorporate the following assumptions about turnover: that existing tenants remain in their units after retrofitting and that there is normal turnover over time (for reasons other than retrofitting) such that existing tenants are gone in 10 years of the retrofitting and 10% leave each year. The results do not account for the possibility that some tenants would be exempt from rent increases for retrofitting on the basis of hardship.

SOURCE: Recht Hausrath & Associates

APPENDIX TABLE 8
SUMMARY OF POTENTIAL INCREASES IN RENTS DUE TO RETROFITTING FOR UMBs COVERED BY THE RESIDENTIAL RENT STABILIZATION ORDINANCE THAT ARE RETROFIT PER REQUIREMENTS

Number of Annual Increases in Rents	Distribution of Housing Units					
	Alternative 1		Alternative 2		Alternative 3	
	No. Units	Percent	No. Units	Percent	No. Units	Percent
For Apartments						
1	1,033	10	961	10	555	10
2	6,965	67	1,384	14	555	10
3	1,717	17	4,578	48	1,128	20
4	447	4	2,118	22	2,729	49
5	88	1	426	5	433	8
6	26	small	114	1	37	1
7	48	1	7	small	54	1
8	2	small	17	small	63	1
9	-	-	-	-	-	-
10	-	-	-	-	-	-
TOTAL	10,327	100%	9,605	100%	5,554	100%
For Residential Hotel Units						
1	1,293	12	887	10	400	10
2	6,781	65	5,847	67	2,446	61
3	863	8	252	3	144	4
4	748	7	252	3	144	4
5	802	8	1,514	17	863	21
6	-	-	-	-	-	-
7	-	-	-	-	-	-
8	-	-	-	-	-	-
9	-	-	-	-	-	-
10	-	-	-	-	-	-
TOTAL	10,487	100%	8,752	100%	3,996	100%

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APPENDIX TABLE 8 (continued)
SUMMARY OF POTENTIAL INCREASES IN RENTS DUE TO RETROFITTING FOR UMBs COVERED BY THE RESIDENTIAL RENT STABILIZATION ORDINANCE THAT ARE RETROFIT PER REQUIREMENTS

NOTE: This table accounts for the building outcomes expected as a result of retrofitting requirements. The housing units described in this table are those in UMBs that would be retrofit per requirements for the Alternatives. The table excludes units in existing UMBs that eventually would be demolished or converted to other uses as an alternative to retrofitting.

Under Rent Board Rules and Regulations governing rent increases for capital improvements such as retrofitting, annual increases in rents would be limited each year and those annual increases would accumulate over the years until the total amount of additional rent for retrofitting equals the annual amortized cost of retrofitting. There also would be a market limit beyond which landlords would not be able to pass through costs of retrofitting to tenants. Once either of these "limits" was reached, the total additional rent would remain at that level for subsequent years until the unit's share of retrofitting costs were paid. Rents would return to the amounts they would have been without the addition for retrofitting once the unit's share of costs was paid. The results summarized in this table identify the number of annual increases in rents that would occur before one of the limits on additional increases would be reached or before the tenant left the unit as a result of the normal course of turnover (in the event they left before the cost limit or market rent limit on annual rent increases was reached). Rent increases are described in terms of the number of annual increases because it is not possible to generalize as to the cumulative total increase in percentage terms. The text provides more explanation.

The results are based on average rents for types of housing by location. Rents for individual units and buildings would vary from these averages. The distribution of outcomes probably would be more dispersed than shown above if the calculations were done with actual rents for every unit. It is not possible to account for such specific conditions in an aggregate analysis of this type. The results above are most useful in highlighting the differences among the Alternatives because the calculations for each are based on the same assumptions and approach.

The results above incorporate the following assumptions about turnover: that existing tenants remain in their units after retrofitting and that there is normal turnover over time (for reasons other than retrofitting) such that existing tenants are gone in 10 years of the retrofitting and 10% leave each year. The results do not account for the possibility that some tenants would be exempt from rent increases for retrofitting on the basis of hardship.

SOURCE: Recht Hausrath & Associates

APPENDIX TABLE 9
SUMMARY OF HOW HIGHER RENTS DUE TO RETROFITTING COULD COMPARE TO MARKET RENT LEVELS, FOR ALL UMBs COVERED BY THE RESIDENTIAL RENT STABILIZATION ORDINANCE

	Distribution of Housing Units					
	Alternative 1		Alternative 1		Alternative 3	
	No. Units	Percent	No. Units	Percent	No. Units	Percent
Apartments						
Higher Rents Eventually Reach Market Levels	79	1	1,710	16	4,215	40
Higher Rents Remain Below Market Levels	10,436	99	8,805	84	6,300	60
Subtotal /a/	10,515	100%	10,515	100%	10,515	100%
Residential Hotel Units						
Higher Rents Eventually Reach Market Levels	3,065	28	8,369	78	8,750	81
Higher Rents Remain Below Market Levels	7,710	72	2,406	22	2,025	19
Subtotal /a/	10,775	100%	10,775	100%	10,775	100%
TOTAL UNITS						
Higher Rents Eventually Reach Market Levels	3,144	15	10,079	47	12,965	61
Higher Rents Remain Below Market Levels	18,146	85	11,211	53	8,325	39
TOTAL /a/	21,290	100%	21,290	100%	21,290	100%

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APPENDIX TABLE 9 (continued)
SUMMARY OF HOW HIGHER RENTS DUE TO RETROFITTING COULD COMPARE TO MARKET RENT LEVELS, FOR ALL UMBs COVERED BY THE RESIDENTIAL RENT STABILIZATION ORDINANCE

NOTE: The housing units described in this table are those in all UMBs (628) covered by the Residential Rent Stabilization Ordinance. This table does **not** account for the building outcomes expected as a result of retrofitting requirements. The table indicates the results if all UMBs were retrofit as required. It is provided to identify rent impacts for tenants if **all** UMBs were retrofit.

Under Rent Board Rules and Regulations governing rent increases for capital improvements such as retrofitting, annual increases in rents would be limited each year and those annual increases would accumulate over the years until the total amount of additional rent for retrofitting equals the annual amortized cost of retrofitting. There also would be a market limit beyond which landlords would not be able to pass through costs of retrofitting to tenants. Once either of these "limits" was reached, the total additional rent would remain at that level for subsequent years until the unit's share of retrofitting costs was paid. Rents would return to the amounts they would have been without the addition for retrofitting once the unit's share of costs was paid. The results summarized in this table describe the extent of potentially higher rents for existing tenants remaining in their retrofitted units in terms of whether tenants would eventually be paying market rents for a period of time as a result of retrofitting, or whether they would be paying rents that remained below market levels even thought those rents were higher because of retrofitting.

The calculations estimating rent increases are based on average rents for types of housing by location. Rents for individual units and buildings would vary from these averages. It is not possible to account for such specific conditions in an aggregate analysis of this type. The results above are most useful in highlighting the differences between the alternatives because the calculations for each are based on the same assumptions and approach.

The results above incorporate the following assumptions about turnover: that existing tenants remain in their units after retrofitting and that there is normal turnover over time (for reasons other than retrofitting) such that existing tenants are gone in 10 years of the retrofitting and 10% leave each year. The results do not account for the possibility that some tenants would be exempt from rent increases for retrofitting on the basis of hardship.

/a/ There are 10,516 apartments and 10,791 residential hotel units in the 628 UMBs covered by the Residential Rent Stabilization Ordinance (assuming that UMBs with five or more residential units are covered). The estimates of rent increases for retrofitting were not calculated for one apartment unit and 16 residential hotel units because of missing data.

SOURCE: Recht Hausrath & Associates

APPENDIX TABLE 10
SUMMARY OF POTENTIAL INCREASES IN RENTS DUE TO RETROFITTING FOR ALL UMBs COVERED BY THE RESIDENTIAL RENT STABILIZATION ORDINANCE

Number of Annual Increases in Rents	Distribution of Housing Units					
	Alternative 1		Alternative 2		Alternative 3	
	No. Units	Percent	No. Units	Percent	No. Units	Percent
For Apartments						
1	1,051	10	1,051	10	1,051	10
2	7,059	67	1,475	14	1,052	10
3	1,770	17	4,794	46	2,398	23
4	450	4	2,274	22	3,458	33
5	95	1	734	7	2,203	21
6	28	small	135	1	111	1
7	60	1	14	small	105	1
8	2	small	34	small	113	1
9	-	-	4	small	24	small
10	-	-	-	-	-	-
TOTAL /a/	10,515	100%	10,515	100%	10,515	100%
For Residential Hotel Units						
1	1,322	12	1,089	10	1,078	10
2	6,957	64	7,190	67	7,201	67
3	929	9	312	3	312	3
4	750	7	312	3	312	3
5	817	8	1,872	17	1,872	17
6	-	-	-	-	-	-
7	-	-	-	-	-	-
8	-	-	-	-	-	-
9	-	-	-	-	-	-
10	-	-	-	-	-	-
TOTAL /a/	10,775	100%	10,775	100%	10,775	100%

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APPENDIX TABLE 10 (continued)
SUMMARY OF POTENTIAL INCREASES IN RENTS DUE TO RETROFITTING FOR ALL UMBs COVERED BY THE RESIDENTIAL RENT STABILIZATION ORDINANCE

NOTE: The housing units described in this table are those in all UMBs (628) covered by the Residential Rent Stabilization Ordinance. This table does **not** account for the building outcomes expected as a result of retrofitting requirements. The table indicates the results if all UMBs were retrofit as required. It is provided to identify rent impacts for tenants if **all** UMBs were retrofit.

Under Rent Board Rules and Regulations governing rent increases for capital improvements such as retrofitting, annual increases in rents would be limited each year and those annual increases would accumulate over the years until the total amount of additional rent for retrofitting equals the annual amortized cost of retrofitting. There also would be a market limit beyond which landlords would not be able to pass through costs of retrofitting to tenants. Once either of these "limits" was reached, the total additional rent would remain at that level for subsequent years until the unit's share of retrofitting costs was paid. Rents would return to the amounts they would have been without the addition for retrofitting once the unit's share of costs was paid. The results summarized in this table identify the number of annual increases in rents that would occur before one of the limits on additional increases would be reached or before the tenant left the unit as a result of the normal course of turnover (in the event they left before the cost limit or market rent limit on annual rent increases was reached). Rent increases are described in terms of the number of annual increases because it is not possible to generalize as to the cumulative total increase in percentage terms. The text provides more explanation.

The results are based on average rents for types of housing by location. Rents for individual units and buildings would vary from these averages. The distribution of outcomes probably would be more dispersed than shown above if the calculations were done with actual rents for every unit. It is not possible to account for such specific conditions in an aggregate analysis of this type. The results above are most useful in highlighting the differences among the Alternatives because the calculations for each are based on the same assumptions and approach.

The results above incorporate the following assumptions about turnover: that existing tenants remain in their units after retrofitting and that there is normal turnover over time (for reasons other than retrofitting) such that existing tenants are gone in 10 years of the retrofitting and 10% leave each year. The results do not account for the possibility that some tenants would be exempt from rent increases for retrofitting on the basis of hardship.

/a/ There are 10,516 apartments and 10,791 residential hotel units in the 628 UMBs covered by the Residential Rent Stabilization Ordinance (assuming that UMBs with five or more residential units are covered). The estimates of rent increases for retrofitting were not calculated for one apartment unit and 16 residential hotel units because of missing data.

SOURCE: Recht Hausrath & Associates